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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 38.] 1941. [No. 4.

SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

[*continued from* p. 144.]

Treatment.

CRAIG (p. 791) argues against the "short term" treatment of malaria, stating that the aim of the physician should be to eliminate infection. He maintains that there is no adequate evidence that short treatment results in efficient premunition or in immunity, and that it is dangerous in that it does not prevent the pernicious symptoms of subtertian malaria. It also favours the development of carriers. [These views may be set against those of SINTON referred to under *Immunity* in the preceding Summary of Recent Abstracts (this *Bulletin*, 1941, Vol. 38, p. 141).]

SANDERS and DAWSON (p. 185) found that after treatment consisting of 20 grains of quinine daily for 5 days, relapses of malaria occurred in 25 to 45 per cent. of patients. These relapses were rather more frequent in *P. falciparum* than in *P. vivax* infections. The fever, however, was suppressed as rapidly as with larger initial doses.

NIVEN (p. 131) found no difference in efficiency between totaquina and quinine in benign tertian malaria; neither is an efficient gametocide. The optimum dose of totaquina for adults is 2 gm. each day. WIJERAMA (p. 668) has compared totaquina with quinine bisulphate in the treatment of malaria, and has found the former to be the more effective.

SIEGENBEEK VAN HEUKELOM (p. 745) discusses the haemoglobin changes after treatment of subtertian malaria with atebrin or quinine or both. Low blood haemoglobin figures tend to rise and high figures (which may be due to blood concentration) to fall.

COPPOLA (p. 601) considers that variations in the bilirubin content of the blood are more likely to be caused by malaria than by any possible haemolytic action of quinine; he states that there is no evidence that quinine influences the normal process of haemolysis.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1940, Vol. 37. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

VARTAN and DISCOMBE (p. 865), however, record a case of quinine poisoning, unconnected with malaria, in which symptoms closely resembling those of blackwater fever were produced.

MARILL *et al.* (p. 291) state that for the treatment of splenomegaly, presumably caused by malaria but in many cases of which parasites cannot be found in the blood, intravenous medication with quinine, quinacrine and praequine in an ordered method is more successful than oral medication. The treatment is set out in detail; the course lasts for 9 weeks.

SOKHEY (p. 292) has studied the concentration of atebrin in the blood and tissues after oral or parenteral administration.

DIKSHIT (p. 745) shows that neither plasmoquine nor atebrin, in therapeutic doses, influences the activity of non-pregnant uterine muscle. In therapeutic doses plasmoquine does not pass the placenta, and even in doses toxic to the mother does not influence the respiration or cardiac action of the foetus. SOKHEY (p. 292) similarly reports that plasmoquine and atebrin in therapeutic doses are filtered out by the human placenta.

RASKINE (p. 746) found that treatment of subtertian malaria with acriquine and quinoline 31 was effective, and that schizonts and gametocytes rapidly disappeared from the blood.

CHRISTOPHERS and FULTON (p. 745) have investigated the dissociation constants of plasmoquine.

MOLLARET and SCHNEIDER (p. 457) describe the dysgonic action of rhodopraequine which, when given subcutaneously after a number of paroxysms, arrests the fever without entirely destroying the parasites.

NIVEN (p. 135) found that Paludex was not efficient in the treatment of *P. falciparum* infections in the Federated Malay States. As a result of the treatment of a considerable number of cases of malaria he (p. 134) concludes that Prontosil album is much less efficient and is more dangerous and costly than quinine. It is therefore not a useful addition to the therapeutic armament against malaria. YAMAMOTO (p. 746) reports unfavourably on sulphanilamide in malaria. FARINAUD and ELICHE (p. 185), however, found that sulphonamide derivatives (soluseptasine and septasine) have remarkable schizonticidal activity though they are not efficient antipyretics. They have no action on gametocytes of *P. falciparum* but those of *P. vivax* are sensitive to the drugs. CHOPRA *et al.* (p. 503) obtained good results, including the disappearance from the blood of sexual and asexual forms of *P. vivax* and asexual forms of *P. falciparum*, by giving daily doses of 4 gm. M. & B. 693 for 5 days. CHOPRA *et al.* (p. 186) report that Prontosil possesses mild anti-malarial properties against Indian strains of the three main species. GONZALEZ BARRERAS (p. 362) has obtained favourable results with Prontosil.

CLEVELAND and TURVEY (p. 186) advise that if Mapharsen is used to terminate therapeutic malaria, a full course should be given; reliance should not be placed on a single dose. YOUNG and MCLENDON (p. 362) show that 10 weekly injections of Mapharsen do not eradicate infection with *P. malariae* although symptoms are relieved. Tryparsamide has a similar effect.

GARRA (p. 865) has obtained success in treatment by intravenous antimony tartrate in cases of malaria, especially in primary infections. The drug has a remarkable effect on the enlarged spleen and causes improvement in the general condition.

MANCA (p. 503) writes in favour of M_3 (manganese iodo-mercurate) in treatment, and states that it has a prophylactic effect which is not immediate but which becomes evident from the first to the sixth month after treatment. He believes that it acts on the reticulo-endothelial system; it has a tonic action and is well tolerated. CHOPRA and BASU (p. 503), however, found M_3 to be useless as a prophylactic in an experiment with 8 volunteers. CHOPRA *et al.* (p. 746) state that M_3 is useless in the treatment of malaria.

DECOURT *et al.* (p. 135) report unfavourably on Cilional (Certuna) as a gametocide in *P. falciparum* infections. There was, however, an improvement in the general condition of the patients, and no intolerance was observed, but the authors consider that the drug is less effective than either praequine or rhodoquine.

CASINI (p. 363) reports unfavourably on the Ascoli method of treatment carried out on patients with uncomplicated malarial splenomegaly in Sardinia, and controlled by similar but untreated cases. Adrenalin in doses of 1/10 or 1/20 mgm. occasionally produced unpleasant symptoms and the full treatment did not cause reduction in the number of attacks, diminution in the size of the spleen, or improvement in the blood or general condition. The work was carried out in spring and summer [and the patients were therefore probably liable to reinfection]. Very similar results are recorded by MAROTTA (p. 363) in patients treated in Rome. These two papers differ remarkably from the enthusiastic reports given in recent years by other Italian workers who have employed the Ascoli method.

PIZZILLO (p. 602), however, who is a confirmed adherent of the method, reports that the late results of the Ascoli method of treatment of primary infections were excellent in 57 patients studied. He (p. 364) claims that by using it he was able to cure the nervous symptoms (one cerebellar syndrome and two cases of sciatica) which arose as complications of malaria. FAIGUENBAUM (p. 504) reports very favourably on the Ascoli treatment for both chronic and acute cases, and DIAMANTI (p. 504) obtained good results in 6 of 8 chronic cases.

Drug Prophylaxis.

The papers on drug prophylaxis may be divided into those dealing with non-immune persons, and those dealing with indigenous populations in which the people have probably been infected several times in the course of their lives. A division has here been attempted on these lines since it seems probable that drug prophylaxis may differ in its value and mode of application in the two groups.

In non-immune persons.—In a discussion of malaria in war CHRISTOPHERS (p. 174) and other speakers remarked upon the necessity for planning in the provision of facilities for diagnosis and of larvicides, sprays, nets and other materials which might be called for by armies operating in malarious areas. Campaigning conditions, however, may be such that mosquito control is not possible, and most of the speakers agreed that drug prophylaxis, with either quinine or atebrin, was an essential requirement and should be properly administered. Drug prophylaxis will not prevent infection but will prevent attacks of malaria. CASTELLANI (p. 175) states that in the Abyssinian campaign the Italian forces suffered very little from malaria and attributes this to the rigidly enforced quinine prophylaxis. PANSINI (p. 452), on the other hand, writing of Italian labourers repatriated from Abyssinia

on account of malaria, states that many of these men had been taking prophylactic quinine in what are generally regarded as adequate doses when first attacked.

For Europeans in Liberia JUNGE (p. 603) advises the daily administration of 0·05 gm. atebrin. This was, in his prolonged experiments, effective in preventing attacks of malaria, and gave only slight coloration of the skin. Reduction of the dose to 0·3 gm. given on one day each week was followed, in most of the persons concerned, by attacks of quartan or subtertian malaria.

In indigenous populations.—As a result of a careful experiment carried out in Sardinia, and lasting for 3 years, CASINI (p. 132) concludes that by atebrin or quinine prophylaxis, especially if continued through the inter-epidemic period, accompanied by prompt treatment of all febrile attacks, it is possible to reduce malaria symptoms, spleen rates and parasite rates, and to effect a marked improvement in the health of a population, but it is not possible thus to eradicate the disease. Details of administration are given. Atebrin was much more effective than quinine in preventing subtertian fever.

NIVEN (p. 131) shows that on an estate in Malaya, which is surrounded by swampy jungle where there is uncontrolled anopheline breeding, drug prophylaxis with either atebrin or quinine was successful in suppressing clinical malaria. The dose of atebrin necessary was 0·3 gm. once each week, and this caused marked reduction in the number of gametocyte carriers; 1·0 gm. quinine once each week proved to be insufficient. It was found that cessation of drug prophylaxis was followed by a marked increase of clinical malaria.

In a district of Panama, where for several years all persons found at monthly surveys to have parasites in the blood have been treated with atebrin (or quinine) and plasmoquine, CLARK *et al.* (p. 668) found that, in an exceptionally dry year which favoured the breeding of anophelines in backwaters of rivers, epidemic malaria ensued. This experiment in drug prophylaxis has been tried over a period of several years in an area where anti-mosquito measures cannot be carried out.

RASHINA and KHOVANSKAYA (p. 133) show that considerable results have been achieved in the reduction of malaria in the town of Khamidié by treatment and drug prophylaxis. All persons with parasites in the blood were treated with acriquine and plasmocide and during the transmission season were given plasmocide regularly. Irrigation canals are responsible for most of the anophelines, and the authors state that complete malaria control will necessitate anti-mosquito measures in addition to drug prophylaxis.

BAEZA (p. 133) reports a marked improvement in malaria and in general health in a small community in Perak in which plasmoquine alone was used as a prophylactic, and in which anti-larval measures were not possible.

In tuberculous patients in Madagascar GRIMES and LAVERGNE (p. 864) have found rhodoquine, praequine and rhodopraequine to be of very definite value when given prophylactically. In the sanatorium in which the work was carried out almost all the tuberculous patients had suffered from malaria and reinfection with malaria was possible. This constitutes a serious complication of tuberculosis, especially in patients undergoing pneumothorax treatment, in whom an attack of malaria tends to produce pleural effusion. Rhodoquine is the drug

best tolerated and is the most effective; it is given in doses of 0·03 gm. daily for 5 consecutive days each month, and appears to prevent pleural effusion. The action of these drugs—described as dysgonic—is regarded as inhibitive rather than prophylactic, but is effective for the purpose desired.

DUPOUX *et al.* (p. 134) in Tunisia give a curative treatment of premaline (an association of quinacrine and rhodopraequine) to persons found harbouring parasites and also distribute this drug to the population twice each month between 1st June and 1st November. No anti-mosquito measures were undertaken during the three years under consideration but the results of this drug prophylaxis were most remarkable and the only cases of malaria found were in persons arriving from outside the area in question. No relapses were seen in those treated for the disease who subsequently received the drug at bi-monthly intervals. Figures are given of the decline in parasite and spleen rates. GENEVRAY *et al.* (p. 293) have also used premaline as a prophylactic with success. In Tonking they found that administration every 10 days was insufficient but that when the drug was given weekly the spleen rates of children were greatly reduced, the parasite rates fell to zero, no case of malaria was seen and the general health improved, though previously the incidence of malaria had been very high. The infection rate of *A. minimus* was only partly reduced. TOUMANOFF and HOANG-TICH-TRY (p. 187) show similarly that even a considerable reduction in the proportion of gametocyte carriers is not likely to result in great reduction of the infection rate of *A. minimus* if there is free contact between the mosquito and man. Drug prophylaxis therefore in this district is only likely to be useful if accompanied by antilarval measures.

CHOPRA and BASU (p. 55) show that even large doses of Prontosil fail to devitalize crescents.

Control.

General.—CHRISTOPHERS and others (p. 174) discuss the prevention of malaria among troops in war time. Anti-larval measures should, of course, be adopted where possible, but it is probable that conditions will be such that the only practicable measures will be those applicable to the individual soldiers, their tents, huts or barracks. Mosquito repellents, nets, insecticidal sprays and the prophylactic use of drugs, therefore, are important and should be provided. All necessary apparatus for diagnosis should be provided.

ROBERTSON (p. 792) has advocated measures for the protection of workers on the China-Burma highway. For transport workers mosquito nets should be provided, screened hostels erected at parking places, vehicles in which drivers have to sleep should be sprayed with insecticide, and quinine prophylaxis should be employed. More permanent measures, on the usual lines, should be used for the protection of labour gangs.

FARINAUD (p. 136) gives a list of the measures of control which, together with drug prophylaxis, have been successful in causing a great decline in morbidity and mortality from malaria on an estate which had previously been a focus of heavy infection.

On coffee estates in Tanganyika Territory, where *A. gambiae* is the principal vector, WILSON (p. 792) has employed oiling, the filling of borrow pits and pools with cut vegetation, and the construction of earth drains. The cost was about £12 per square mile, and by

these means the malaria transmission season was reduced from 8 to 3 or 4 months in the year, while anopheline infestation in the transmission season was reduced to one-sixth of its previous level. Anopheline infectivity was reduced from 4·6 to 3·6 per cent.

HOLMES (p. 136) shows that in Kuala Lumpur malaria was caused by *A. maculatus* which were breeding at least a mile away, and states that routine trapping of Anopheles at fixed points is essential; it allows of earlier extension of larval control than would otherwise be possible.

Drainage.—BARROWMAN (p. 458), writing of the chances of subsoil drains laid near trees becoming choked by the roots, shows that if two pipe lines, one above the other, are laid, their effective life is six times as long as that of a single line. In suitable soils fascine drainage is an alternative to pipes for drainage near trees.

O'NEILL (p. 364) points out the difficulty of preventing the formation of pools in unlined road ditches, and describes the construction of concrete linings to prevent this.

COVELL and HARBHAGWAN (p. 740) have found herbage packing to be useful in controlling the breeding of *A. fluviatilis* in rice-field drains. They point out that attempts to drain swamps in the past have provided increased breeding facilities for this dangerous vector in the Wynaad district of S. India. Shading is a method suitable for estates.

BLACKLOCK (p. 294) discusses the functions and use of siphons, and NICHOLAS (p. 293) describes a simple and effective automatic sluice used in Malaya.

Oiling.—MURRAY (p. 294) has investigated the spreading power of oils used in larvicidal work. The findings cannot be further abstracted, but he states that commercial oils owe their spreading power to impurities, which are only present in small quantities and which can be removed. DANILOVA and BUDUIMKO (p. 505) report on acidol, a mixture of naphthalene acids obtained in the process of distillation of petroleum oils. It is highly toxic to larvae and pupae and spreads well at water temperatures of 25–31°C., but below 17°C. spreading is poor and the larvae are not killed. KUBO and OHITO (p. 365) have found a new and efficient larvicide oil in Dapus oil and Leave [? residual] oil, in equal parts, using 1 litre to 1·5–2 acres for rice fields. The oil does not harm the rice plant. In Delhi COVELL and AFRIDI (p. 747) use a mixture of diesel oil and cresol as a larvicide and emphasize the importance of the spraying of dwellings with pyrethrum insecticides.

Paris green etc.—In *Public Works* (p. 505) it is stated that the relative toxicity of any arsenical depends upon its fineness. The maximum particle size of ordinary Paris green is about 20μ, but a new type (Ansbacher's subsurface floating) with a maximum particle size of 2μ has been prepared. This is lighter and floats for several hours, after which some passes through the surface film and floats directly beneath it. It is believed that this new type controls Anopheles better than the old type, and also controls Culex.

CORRADETTI (p. 793) has used airplane dusting of Paris green in a localized area of Combolcia, together with mosquito proofing, spraying of insecticide and prophylactic quinine.

A table (p. 193) has been constructed to show the effects of various conditions on the dusting of Paris green from aircraft. The work of several authors during recent years is included.

Table showing the effects of various conditions on the dusting of Paris green from aircraft.

	Authors						
	Williams & Cook 1927 *Public Health Rep.* Vol. 42, p. 459	Cook & Williams 1928 *Southern Med. Jl.* Vol. 21, p. 754	Watson 1936 This *Bulletin*, 1937, Vol. 34, p. 71		Kiker, Fairer & Flanary 1938 This *Bulletin*, 1938, Vol. 35, p. 805	Watson, Kiker & Johnson 1938 This *Bulletin*, 1938, Vol. 35, p. 512	Covell & Afridi 1937 This *Bulletin*, 1937, Vol. 34, p. 638
Speed of plane m.p.h.	65	60	100		80–90	80	70
Altitude of flight	100 ft. in 7 mile wind 200 ft. in bumpy air (& used 50 per cent. P.g.)	150–200 ft. in dead calm 25–40 ft. in 10–12 mile wind	50 ft.	150 ft.	20–25 ft.	25 ft.	75 ft.
Per cent. Paris green in dust mixture	25 in under 6 mile winds	25–33	11–12·5	11–12·5	20	20	33
lbs. Paris green per acre	1	1	1	1	1	1	1
Width of strip dusted	at 100 ft. over open water 1/4–1/3 mile	at 50 ft. 200 yds.	520 ft.	560 ft.	200 ft.	300 ft.	120 yds.
Particles of P.g. per sq. in. of receiving surface	over 25 no vaseline on slide	28–69 no vaseline on slide	120	23 vaseline on slide	1,100 with 20% P.g., 437 with 10% P.g. vaseline on slide		over 25 to 100
Maximum wind velocity allowable	under 4 m.p.h., under 100 ft. alt. 25 per cent. P.g. over 4 m.p.h., over 100 ft. alt. 50 per cent. P.g.		under 5 m.p.h.				

SERGUIEV *et al.* (p. 506) describe a motor pulverizer for distributing Paris green. It can be carried on a vehicle or a launch and with it larvae may be completely eradicated over an area of water up to 50 metres in breadth. It is more efficient in every way than a manual pulverizer, can deal with larger areas and is cheaper to operate.

JURCHAK and BOZHENKO (p. 295) write of the value of Paris green suspensions in water which are stated to be more effective, cheaper and more convenient than dust mixtures. Petroleum or naphtha increases the floatability of the Paris green and the following suspension is recommended:—Paris green 0·6 kgm., naphtha or petroleum 1 to 2 kgm., suspended in water, per hectare of surface to be treated. In Cyprus, AZIZ (p. 187) has found that a uniform suspension of Paris green in water, when sprayed on anopheline breeding places, gives better results than the usual dusting process and has the additional advantage of economy in that only one-third or one-quarter of the amount is needed. There is also a saving in time and labour and the danger of arsenical poisoning in the personnel is much reduced. SYDDIQ (p. 365) uses mud balls, weighing about 2 ounces and containing 2 per cent. Paris green, each ball being sufficient for about 4 cubic feet of water. The Paris green is liberated and is fatal to Culex as well as Anopheles. In rice fields periodic drying is effective against larvae but not so much so against pupae.

RUSSELL and JACOB (p. 506) report that, for the control of anopheline larvae in casuarina pits, Paris green is effective, but that the best results are obtained by stocking the pits with *Gambusia affinis.* Naturalistic methods were found to be unsatisfactory.

SERGENT (p. 187) draws attention to the fact that Gambusia eat their young, and has devised a method of preventing this in breeding tanks.

Insecticidal sprays.—COVELL (p. 866) points out that in small isolated communities where other methods are not economically feasible the spraying of insecticides within houses, under adequate organization and supervision, merits further trial. The cost of spraying compares favourably with that of temporary anti-larval measures. RUSSELL and KNIPE (p. 504) report considerable success in the prevention of malaria in a village in Madras by the spraying of houses with a mixture of kerosene 19 parts, and Pyrocide 20 one part. Spraying once a week from June to December was markedly effective, and spraying twice a week even more successful. The cost, however, was higher than the people could be expected to afford. DE BURCA (p. 56) reports satisfactory results from the regular spraying of barracks in Quetta with the same mixture. A local fish was found to be efficient in destroying anopheline larvae and pupae. FRATANI (p. 496) near Oran has also found a local fish to be useful. CLUVER (p. 866) reports great success in N. Natal in the control of malaria by the weekly spraying of houses with a mixture of pyrethrum and commercial paraffin. The vectors concerned are *A. gambiae* and *A. funestus,* both exclusively anthropophilic and house-frequenting. Labour and economic conditions have shown a marked improvement since this method was adopted.

In discussing control measures in Mombasa, where considerable numbers of adult *A. gambiae* are brought to the island in trains from the mainland, WISEMAN *et al.* (p. 786) advocate measures for the destruction of adults in trains. *A. gambiae* probably reaches the island

by direct flight from the mainland, and experiments with stained *Aëdes aegypti* have shown that it too can fly from the mainland to the island.

Malaria of Birds and Monkeys.

Birds.

GIOVANNOLA (p. 367) has published an extensive discussion of the bird malaria parasites. [Reference may also be made to a recent book by HEWITT on bird malaria, reviewed in this *Bulletin*, 1941, Vol. 38, p. 120].

TADDIA and VIERO (p. 793) favour the view that exo-erythrocytic schizonts do not represent an essential stage in the life cycle of *P. relictum*, but that they occur as a result of the increased number of phagocytic cells in the reticulo-endothelial system caused by the malarial infection.

JAMES (p. 59) shows that in fowls, inoculation with sporozoites of *P. gallinaceum* produces exo-erythrocytic schizonts in the acute stage of infection, but blood inoculation produces these forms more especially in the chronic stage. There is a higher rate of mortality when these exo-erythrocytic forms are present than when they are not. It appears that these forms can arise from parasites which have developed in red blood cells, because in 70 per cent. of the infections resulting from blood inoculation they do not appear until after the acute phase has passed. MANWELL and GOLDSTEIN (p. 60) state that exo-erythrocytic schizonts of *P. circumflexum* appear in canaries most commonly just after parasites first appear in the peripheral blood.

CHORTIS (p. 459) considers that, in *P. gallinaceum* infections, exo-erythrocytic schizonts are the result of imperfect phagocytic action of the endothelial cells, which allows the ingested forms to develop instead of destroying them.

MISSIROLI (p. 671) considers that the sporozoites of canary parasites, if mature, may develop at the site of inoculation, but if less mature they first migrate to the spleen. The sporozoite becomes ovoid and divides into 4 units, and this process takes place extracellularly. These bodies may then enter red blood cells or reticulo-endothelial cells, to produce respectively pigmented and non-pigmented parasites. From a study of the development of sporozoites of *P. cathemerium* injected into the muscles of canaries, KIKUTH and MUDROW (p. 671) conclude that the sporozoite first enters an endothelial cell and becomes an exo-erythrocytic schizont. The merozoites from this may infect other endothelial cells or red blood cells. These authors (p. 188) believe that exo-erythrocytic schizonts result only from sporozoites or merozoites or other exo-erythrocytic forms, but that merozoites of these forms may give rise to exo-erythrocytic or to pigmented forms in the red blood cells. Merozoites of the red cell forms, on the other hand, cannot produce exo-erythrocytic forms. The precursors of the exo-erythrocytic forms of *P. cathemerium* occur in blood and can be transferred by blood inoculation, but this does not hold in the case of *P. relictum*. By subinoculation with liver emulsions (in which the exo-erythrocytic forms are numerous) a fairly stable infection with *P. cathemerium*, with large numbers of these forms, was produced, and the effects of quinine, atebrin, certuna and plasmoquine, given from the time of inoculation, were tested. Of these only plasmoquine affected the exo-erythrocytic forms, reducing the numbers

though not eliminating them. With sporozoite infections of *P. relictum* the results were similar except that both Certuna and plasmoquine cured the infections. The general conclusion is that all the drugs have an action on the pigmented blood forms, but plasmoquine alone has some action on the non-pigmented exo-erythrocytic forms in the cells of the reticulo-endothelial system.

From experiments with *P. cathemerium*, BOYD and DUNN (p. 189) conclude that quinine and plasmoquine each reduce the rate of reproduction rather than increase the normal destruction of the parasites. This affords an explanation of why quinine fails to eradicate an infection but reduces it to a low level.

DECOURT *et al.* (p. 458) show that in fowls infected with *P. gallinaceum* there occurs a phase in which, after being infective, the blood becomes non-infective to other fowls although it still contains parasites.

WOLFSON and CAUSEY (p. 672) show that canaries which have recovered from *P. cathemerium* infection induced by blood inoculation are immune to both trophozoite and sporozoite inoculations. MANWELL and GOLDSTEIN (p. 508) find that strains of *P. circumflexum* protect against each other and that *P. rouxi* produces a strong immunity against *P. circumflexum*, but not *vice versa*. REDMOND (p. 58) has shown that cross immunity between a strain of *P. cathemerium* and one of *P. relictum* can be induced by repeated superinfection of birds with the former.

MANWELL and GOLDSTEIN (p. 794) have conferred passive immunity on canaries by injecting serum from canaries hyperimmunized against *P. cathemerium*. This serum is more effective when given before infection than when given after. HEGNER and DOBLER (p. 508) have conferred a slight degree of passive immunity in canaries by injecting serum or spleen emulsion of infected birds.

CAUSEY (p. 507) found that injection of the blood of a duck infected with *P. cathemerium* into splenectomized and non-splenectomized canaries produced infection only in the former, but that the blood of an infected canary produced infection in both. He regards this as due to the action of the spleen in removing foreign red blood cells rather than to a destructive action on the parasites.

Monkeys.

CHRISTOPHERS and FULTON (p. 190) have isolated *P. knowlesi* from red cells by the use of saponin, which removes not only the haemoglobin but also the stroma of the red cells. The parasites were viable and exhibited a small oxygen uptake which was increased by the addition of glucose. FULTON (p. 509) has shown that *P. knowlesi* utilizes glucose, laevulose, maltose, mannose and glycerol by oxidation. The blood sugar and liver glycogen of heavily infected monkeys are much lower than those of normal animals.

SOMOGYI (p. 190) has shown that the serum of monkeys with chronic *P. knowlesi* infection can agglutinate the red cells of other monkeys if 5 to 10 per cent. of these cells contain mature parasites.

EATON and COGGESHALL (p. 368) show that complement-fixing antibodies, but not protective antibodies, are produced in monkeys by the injection of killed *P. knowlesi*, though the latter are provoked by living *P. knowlesi*. The parasiticidal property of serum after infection appears to be due to an anti-erythrocyte substance.

SINGH and SINGH (p. 190) show that M. and B. 693 is capable of eradicating *P. knowlesi* infection in monkeys, but the doses necessary

are considerably greater, in proportion, than those usually given in man. COGGESHALL (p. 670) shows that sulphanilamide may eradicate infection with *P. knowlesi* but may leave *P. inui* unaffected. In smaller doses the drug almost completely inhibits the oxygen consumption of *P. knowlesi* but has no effect on the respiration of *P. inui*.

FULTON (p. 795) shows that the aromatic amidines, given intravenously, have a definite action against *P. knowlesi* in that they render the infections non-fatal, though relapses occur. The drugs inhibit the oxygen uptake of the parasites *in vitro*. On *P. relictum* of birds the actions of the different preparations vary.

By inoculating *P. vivax* into a chimpanzee and, after an interval of 46 days, inoculating human paretics with the blood of this chimpanzee, and producing *P. vivax* infection in those paretics, RODHAIN and MUYLLE (p. 61) have proved that *P. vivax* can live for at least 46 days in the animals. *P. schwetzi*, the comparable parasite of the chimpanzee, is not infective for man. RODHAIN (pp. 367, 669) produces further evidence that *P. reichenowi* of the chimpanzee differs from *P. falciparum* of man, and that *P. schwetzi* of the chimpanzee does not infect man, whereas *P. vivax* of man produces inapparent, but true, infection of the chimpanzee.

RODHAIN and LASSMAN (pp. 459, 509) conclude from their work that the young forms of *P. vivax* and *P. gonderi* reveal a definite preference for immature red blood cells. *Charles Wilcocks.*

THE TYPHUS GROUP AND OTHER FEVERS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

Louse and flea borne.—RUGE and SCHILLING (p. 199) discuss the possibility of the occurrence of typhus without a rash, quoting a number of authors who have reported such cases. Towards the end of an outbreak, when immunity may be relatively high, the rashes become slighter.

MARIANI (p. 199) discusses three species of Rickettsia found in Addis Ababa, *R. prowazeki*, *R. pediculi* and *R. rocha-limae*. The first is that of classical typhus, the second may occasionally be pathogenic for man, but *R. rocha-limae*, abundant in the louse, is not pathogenic for man or experimental animals.

BORRA (p. 200) gives a description of the clinical picture of typhus in the highlands of Abyssinia. D'IGNAZIO *et al.* (p. 200) in Abyssinia have studied the cerebrospinal fluid of patients with typhus. At first it is clear but under pressure, later it may become haemorrhagic ; albumin increases and the cellular content becomes high, the majority of the cells being polymorphonuclears. SANGIOVANNI (p. 201) writes of a toxic neuritis which occasionally follows typhus and which appears to have a predilection for the auditory nerve. GUERRA (p. 201) describes the eyes in typhus. Congestion of the conjunctiva is common, in severe cases there may be swelling of the corneal epithelium with shedding of the surface layers, and inflammatory oedema of the optic nerve may be seen.

LIU *et al.* (p. 202) have investigated typhus in Peiping. In small epidemics the patients are lousy and ill-nourished and the disease is severe ; in sporadic cases the patients are not lousy, but come from

rat-infested houses. Animal tests on strains recovered from patients (with the endemic disease), rats and rat fleas gave conflicting results, and the authors conclude that local orchitic and non-orchitic strains are all of the murine type. It remains to be determined whether the louse-borne type corresponds with the epidemic murine type or with the classical human type. KAKU (p. 203) records a laboratory infection with murine typhus. In papers in the *Vide Nueva* (p. 203) the opinion is expressed that the typhus of Pinar del Rio is of the murine type. Agglutination of *Proteus OX19* takes place in high titre.

GREEN *et al.* (p. 203) found a low incidence of agglutinins for *Proteus OX19* in Southern Arizona.

Tick-borne.—ALEXANDER *et al.* (p. 203) have carried out an investigation of 4 strains of tick-borne typhus virus and one strain of murine virus. In group I (tick-borne type) the parasites were numerous in nuclei of cells cultivated in egg medium, did not readily infect guineapigs, and did not usually provoke agglutination of *Proteus OX19.* Group II (murine) did not show intranuclear parasites, readily infected guineapigs and provoked a reaction to *Proteus OX19.* The viruses of Group I protected against each other but not against Group II (murine), but Group II protected against itself and against Group I. It is suggested that the viruses of Group I are in the Rocky Mountain fever group, and that the virus of Group II is in the typhus fever group. FINLAYSON *et al.* (p. 205) have isolated a virus from a batch of ticks (*Hyalomma aegyptium*) from a cow in S. Africa. There is no cross immunity between this and murine or louse-borne typhus viruses. It is probably a tick-bite fever virus but has points of similarity with that of Q fever.

MAIL (p. 205) gives an account of the bionomics and control of *Dermacentor andersoni*, the vector of Rocky Mountain fever, tularaemia and tick paralysis.

CAMPBELL and KETCHUM (p. 206) in reporting 7 cases of Rocky Mountain fever note that over a large series of cases there was little difference between the case fatality rates of the Eastern and the Western types. COHEN (p. 206) reports a case of Rocky Mountain fever in which there was a relapse three weeks after the initial attack.

Mite-borne.—NICHOLLS (p. 206) reports a case of tsutsugamushi fever from Ceylon.

Vaccination.—LIU and ZIA (p. 207) show that the Weil-Felix reaction was strongly positive in 60 per cent. of persons vaccinated with killed Weigl vaccines, and in 80 per cent. of those who received killed tissue culture vaccine. PANG *et al.* (p. 207) have used mouse embryo tissue with success in the cultivation of typhus Rickettsiae.

OTTO and WOHLRAB (p. 207) write of the advantages of using mice instead of guineapigs in protection tests with *R. mooseri.*

Other fevers.—In an investigation of Q fever in Australia, FREEMAN *et al.* (p. 208) find that a considerable proportion of bandicoots show evidence of infection as judged by the agglutination tests with *R. burneti.* The positive tests were especially numerous in bandicoots highly infested with *Haemaphysalis humerosa*, but there is evidence that this tick does not readily feed on man. A number of human sera were also positive, especially in a group taken from abattoir workers in Brisbane.

ANDERSON (p. 208) has described the technique of the cultivation of viruses on the chorio-allantoic membrane of the developing chick embryo, as applied to work on the sandfly fever virus in Peshawar.

PATIÑO CAMARGO (p. 209) discusses Guáitara fever, a Bartonella infection of which the vector is not yet known with certainty. Both the sandfly and the louse have been suggested as vectors, but proof is not yet available. *C. W.*

RUGE (H.); SCHILLING (Victor). Gibt es Fleckfiebererkrankungen ohne Exanthem? [**Can a Patient suffer from Typhus Fever without a Rash?**]—*Med. Welt.* 1940. Feb. 17. Vol. 14. No. 7. p. 176.

The diagnosis of typhus fever has been denied on categorical grounds —the absence of rash. In reply to a question as to the validity of such grounds Professor Ruge writes that SCHITTENHELM has observed that a rash might be very slight and transient in Russian Jews and that he had not infrequently been unable to decide whether a rash was or was not present. PLETNEW stated that in the Moscow epidemic of 1922 rash was wanting in 7 per cent. of cases. Others have put the proportion considerably higher, OTTO gives 14 per cent., IWASCHENZOFF 18–20 per cent. (in the Pruzana outbreak), and the latter remarks on the more frequent absence in the case of children. VON JACKSCH, ZLOTOGOROFF, STARKENSTEIN, LICHTHEIM and others have recorded typhus without rash, but others of authority, such as BRAUER and JÜRGENS, state that they have never met with such a case. (These quotations are from Mohr-Staehelin's Handbook of Internal Medicine.) Professor Victor Schilling adds that in his experience of a very extensive epidemic in Aleppo, as the outbreak became prolonged and the mortality lower, the rashes became slighter, and often limited to a few spots, difficult to find. It was thought that some degree of immunity had been acquired, so that clinical signs might be but slight and exanthem might fail to appear. *H. H. S.*

MARIANI (G.). *Rickettsia prowazeki, pediculi, rocha-limae* nei pidocchio raccolti negli ambiente indigeni dell' altipiano etiopico. (Nota preventiva.) [**Types of Rickettsia found in Lice on Inhabitants of the Ethiopian Uplands.**]—*Minerva Med.* 1940. Jan. 28. No. 4. pp. 69–72. With 5 figs. & 6 microphotos.

Three species of Rickettsia have been distinguished in Addis Ababa: *R. prowazeki*, *R. pediculi* and *R. rocha-limae*. The first is pathogenic for man, the second usually non-pathogenic but becomes pathogenic occasionally, the third is not pathogenic for man or experimental animals.

In the louse the first-named develops abundantly intracellularly, causing the death of the insect in 4–10 days. Guineapigs infected intraperitoneally show in 80 per cent. of cases a rise of temperature of 1·5°–2°C. lasting for 5–8 days, no scrotal reaction and a low mortality, under 5 per cent. *R. pediculi* develops extracellularly but guineapigs inoculated peritoneally fail to react in any way. *R. rocha-limae* develops well, rapidly and abundantly intracellularly, in the louse, without killing the insect. Intraperitoneal inoculation into guineapigs causes no obvious reaction but these animals and also white mice and rabbits vaccinated with killed Rickettsia produce agglutinins to *R.*

prowazeki and *R. rocha-limae*, but reinoculation with *R. prowazeki* gives rise to disease [see also this *Bulletin*, 1940, Vol. 37, p. 578].

H. H. S.

BORRA (E.). Particolarità cliniche delle Rickettsiosi umane sull' altipiano etiopico. (Nota riassuntiva.) [**Clinical Aspect of Human Rickettsiosis in the Ethiopian Uplands.**]—*Minerva Med.* 1940. Jan. 28. No. 4. pp. 72–76.

The average incubation period is 15–16 days, during which the patient may exhibit such symptoms as malaise, weakness, vertigo, nausea, lumbo-sacral pains, injection of the conjunctivae. Then comes a rise of temperature which may be gradual or abrupt but continues for 9–11 days before falling by crisis ; occasionally one or two pseudocrises precede the true critical fall. Rash appears on the fourth or fifth day, as small pale rose spots, at first fading on pressure, then becoming large and petechial. In about half the cases or less the rash is moderate in extent, macular in type, and affects the thorax, abdomen and back. Nervous manifestations are usually more marked after the first week, and include headache and insomnia (also in the prodromal period) and a typhoid state ; sometimes rigidity, myoclonia, carphology, subsultus and Cheyne-Stokes respiration are observed. Cardio-vascular complications include myocarditis (with cyanosis), small rapid pulse, arrhythmia and perhaps gallop-rhythm ; as a result of vascular changes local necrosis and gangrene may occur, and haemorrhages from gums, nose and intestine. *H. H. S.*

D'IGNAZIO (C.), LOMBARDI (A.) & D'ARCANGELO (D.). L'esame del liquido cefalo-rachidiano nel tifo esantematico. [**The Spinal Fluid in Exanthematic Typhus.**]—*Minerva Med.* 1940. Jan. 28. No. 4. pp. 76–80.

The authors have studied the cerebrospinal fluid from 23 typhus patients and find the following changes : The fluid is present under increased pressure, which may persist for as long as three months after convalescence. It is clear in the first week in all cases, and may remain so, but in those seriously ill it becomes turbid owing to the presence of red corpuscles and in very grave cases the fluid may be frankly haemorrhagic. The amount of albumen varies from 0·2 per thousand in mild cases, in the first week, to 0·4 or 0·5 towards the end of the second week. In a few, 20–30 per cent. of cases, which are very grave the amount may rise to 0·7–1·0 per thousand. A mild Pandy reaction may be seen towards the end of the febrile period, otherwise the globulin reactions are normal. The cellular contents range in a mild case from 10 per cmm. to 30–40 at the end of the febrile period and the first week after ; in severe cases and those likely to prove fatal the number may reach as high as 300 per cmm., the majority being polymorphonuclears. In about one-fifth of the patients the chloride and glucose content are normal ; in grave cases chlorides are diminished to 5–6 per thousand and glucose increased to 0·7–1·0 per thousand. Signs of grave import are progressive neutrophile leucocytosis and haemorrhage in the fluid. *H. H. S.*

SANGIOVANNI (V.). Considerazioni su alcune alterazioni funzionali dell' apparato uditivo negli ammalati di tifo esantematico. [**Functional Disturbances in the Auditory Apparatus in Typhus.**] —*Minerva Med.* 1940. Jan. 28. No. 4. pp. 81–83.

The author has studied 50 cases of typhus and as regards visible changes he finds the membrana tympani normal in 26, opaque in 17 and inflamed in 7 : one patient had to be operated upon for mastoiditis. Functional changes were more common, due, it is thought, to a toxic neuritis like that which occurs after exhibition of certain drugs, quinine, salicylates, etc. The effect may be on peripheral motor nerves, peroneal and ulnar for example, but there seems to be a predilection for the auditory. *H. H. S.*

GUERRA (P.). Le alterazioni oculari nel tifo esantematico. (Nota preventiva.) [**Eye Changes in Typhus.**]—*Minerva Med.* 1940. Jan. 28. No. 4. pp. 83–85.

The observations embodied in this article were the results of study of over two hundred cases of typhus in Addis Ababa in 1938 and 1939. The changes described are those affecting (*a*) the conjunctiva ; (*b*) the cornea ; (*c*) the fundus.

(*a*) *Conjunctiva.*—Congestion is noticed towards the end of the first week of illness, then becoming more marked from day to day. The episcleral vessels are turgid. In some the signs do not appear till the twelfth day and then come on suddenly and acutely. This symptom subsides with the fall of the fever and has usually disappeared when the temperature has been normal for 3–4 days. There is no discharge from the conjunctiva.

(*b*) *Cornea.*—In very serious cases (and in the majority of these death occurs) there may be seen a localized swelling of the corneal epithelium, and soon afterwards the surface layers are shed. The site involved is usually the periphery or is at least paracentral. The lesion may extend and invade nearly a fourth of the cornea.

(*c*) *Fundus.*—About the sixth day an inflammatory oedema of the optic nerve may be seen, at a time when the patient is still conscious but is becoming sensorily obtuse. For the next 8–10 days this may increase, then slowly recedes after the crisis but may be noticeable as long as twelve days after the temperature reaches normal. The vessels, especially the veins, are dilated and congested, then the papilla becomes oedematous and swollen, and, rarely, small whitish spots are seen on the retina, as in albuminuric retinitis. Haemorrhagic foci have not been observed.

[The above five papers are accounts of observations carried out at the laboratory for the study of Rickettsioses in Addis Ababa ; three at least are "preliminary notes." Should present conditions in Abyssinia continue to develop on the lines of the past weeks, a long time will probably elapse before Italian authors will be in a position to amplify these notes. Hence, slight though they are, they have been thought worth brief abstracts in this *Bulletin.*] *H. H. S.*

MUNK (F.). Ueber die zerebralen Krankheitserscheinungen beim Fleckfieber. [**Cerebral Symptoms in Typhus.**]—*Med. Klin.* 1940. Apr. 26. Vol. 36. No. 17 (1844). pp. 452–454.

LIU (Wei-T'ung), CHUNG (Huei-Lan) & ZIA (Samuel H.). **Experimental Studies on Typhus Virus in Peiping with Particular Reference to a Non-Orchitic Murine Strain isolated from a Patient.**—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 588–628. With 12 figs. on 6 plates. [51 refs.]

Of recent years there has been a considerable number of cases of typhus fever in Peiping. Several small epidemics have occurred and the patients when admitted to hospital were found to be lousy and ill nourished; clinically these cases were severe in type and there were some deaths; on the other hand, sporadic cases have been admitted and these people were not lousy but they came from houses which were rat infested, the clinical type of these cases was mild.

It has been suggested on the one hand that these two types of case are due to one and the same virus (the murine virus) modified in the first instance by passage through louse and man or else that the first type of case is due to the historic human virus and the second to the murine virus.

A review of the literature on the subject is included in the paper and an investigation was carried out. Seventeen strains of virus were investigated, 6 from cases of fever (these cases were considered to be of the endemic variety), five from rats caught in the houses from which the patients came and 6 from fleas removed from these rats.

It is emphasized that in any investigation of this kind it is not sufficient to study only the action of the virus on guineapigs but the action on rats and mice must also be investigated; a strain of typhus virus which does not produce orchitis in guineapigs is not necessarily a historic human virus as it may produce fever in rats and mice and be capable of prolonged passage in these animals. There are some murine types which are virulent for rats and mice but which do not give orchitis in guineapigs.

All the 5 strains recovered from rats in this investigation produced marked orchitis in guineapigs and fever in white rats and mice, but of the 6 strains isolated from fleas removed from these rats 4 produced orchitis in guineapigs, one produced only a slight reaction and one none at all and only an inapparent infection in rats, the 4 strains which originally produced reaction lost this property when passaged in guineapigs. Of the 6 strains isolated from cases of endemic typhus, one gave marked orchitis in guineapigs, one showed a slight reaction, and 4 no reaction at all, but the typhus lesions in the brains of these animals were few in number; otherwise there was nothing to distinguish these strains from the historic human virus so far as the animal experiments were concerned. Passage of these strains in guineapigs reduced their virulence for rats but if these strains were subsequently passaged in rats they regained their virulence and produced fever and in some cases the animals succumbed.

The authors conclude that the local orchitic as well as the non-orchitic blood strains are all of the murine type. Some being more or less typical in their behaviour in experimental animals. It is pointed out that when one is dealing with such atypical murine strains (non-orchitic) isolated from human cases difficulties or errors may arise if the hitherto generally accepted criteria are rigidly adhered to in the differentiation of the two types of typhus virus. It is suggested that on the basis of clinical and experimental evidence both louse-borne typhus and flea-borne typhus exist in Peiping but it remains to be

determined whether the louse-borne typhus corresponds with the epidemic variety of murine typhus as has been described by MOOSER, or to the historic human type according to the definition of NICOLLE and ZINSSER. *D. Harvey.*

KAKU (Sōkan). Klinische Seite des Zweiwochen-Fiebers (Febris exanthematica sporadica) in Formosa. III. Teil: Ueber einen Infektionsfall im Laboratorium. [**A Clinical Study of "2 Weeks Fever" (Endemic Typhus) in Formosa. An Accidental Infection in the Laboratory.**]—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1940. Sept. Vol. 39. No. 9. [In Japanese pp. 1401–1406. With 1 chart. German summary p. 1407.]

Eight days after a puncture of a finger, caused by the needle of a syringe charged with infective material from a guineapig, the author developed fever with severe headache. A typical typhus rash appeared on the 4th day and on the 13th day the fever ceased. Blood was taken on the 8th day of the fever and inoculated into a guineapig but without result. However, as the clinical symptoms were typical and a positive Weil-Felix reaction developed, the diagnosis was considered as established. *D. H.*

VIDA NUEVA. Habana, Cuba. 1940. Aug. Vol. 46. No. 2. pp. 65–144. Numerous figs.—Número dedicado a la investigación de tifus Pinareño. [**Typhus in Pinar del Rio.**]

This number is devoted to a congress discussion of typhus as it is found in Pinar del Rio. Agglutination of *Proteus OX19* takes place in high titre and it is thought that the disease is similar to Brill's disease. *C. W.*

GREEN (Robert A.), BREAZEALE (Edward L.) & HARDING (Harry B.). **Incidence of Agglutinins for Proteus OX-19.**—*Southwestern Med.* 1940. Sept. Vol. 24. No. 9. pp. 300–301.

In a study of 10,000 sera from man in S. Arizona it was found that 32 (0·32 per cent.) agglutinated *Proteus OX19* antigen. With two exceptions there was no history or suspicion of typhus or typhus-like infections. It would appear therefore that the incidence of agglutinins for *Proteus OX19* is quite low among the population of Southern Arizona. *D. H.*

ALEXANDER (R. A.); MASON (J. H.); NEITZ (W. O.). **Studies of the Rickettsias of the Typhus-Rocky-Mountain-Spotted-Fever Group in South Africa. I. Isolation of Strains** [ALEXANDER, MASON & NEITZ].—*Onderstepoort Jl. Vet. Sci. & Animal Industry.* 1939. July. Vol. 13. No. 1. pp. 19–23. **II. Morphology and Cultivation** [ALEXANDER & MASON].—*Ibid.* pp. 25–39. With 1 chart & 8 figs. on 2 plates. **III. The Disease in the Experimental Animal. Cross-Immunity Tests** [MASON & ALEXANDER].—*Ibid.* pp. 41–65. With 7 charts. **IV. Discussion and Classification** [MASON & ALEXANDER].—*Ibid.* pp. 67–76. [34 refs.]

Five strains of virus were employed in this important series of researches; they were as follows:—

(*a*) A rickettsial virus obtained in Pretoria from the blood of a dog suffering from a febrile illness.

(*b*) A rickettsial virus isolated from ticks (*Hyalomma aegyptium*) collected from a wild hare.

(*c*) A strain of virus from a case of African tick bite fever in Pretoria.

(*d*) A strain of virus isolated from ticks (*R. sanguineus*) sent from the Pasteur Institute of Tunis and collected from dogs.

(*e*) A strain of the local murine endemic typhus virus.

These strains were maintained by passage in guineapigs or by serial cultivation on the membranes of chick embryos.

The second paper gives a description of the methods of cultivation and of the microscopical appearances demonstrated. When studied in smears from the exudate of the inflamed testicle of infected guineapigs it was found that viruses *a*, *b*, *c*, and *d* (Group I) were similar in appearance, that is in the early stages only a few Rickettsiae could be seen and these were scattered about in the cytoplasm of the monocytes and serosal cells and not aggregated in clumps, whereas in smears from guineapigs infected with virus *e* (Group II), *i.e.* murine typhus, there were masses and clumps of Rickettsiae in the serosal cells and the individual parasites were longer and finer and more delicate than those of Group I. There was also marked polymorphism of the parasites in the murine typhus virus smears.

When smears from the viruses cultivated in egg medium were examined it was also possible to divide the viruses into two groups. In Group I the four viruses *a*, *b*, *c* and *d* gave similar results ; scanty parasites were seen in the cytoplasm of monocytes and serosal cells ; these were more numerous than in the smears from testicular exudates, but most remarkable was the presence of numerous typical intranuclear forms ; whereas with the Group II, murine virus, although the serosal cells contained masses of delicate polymorphic Rickettsiae there was none whatever within the nuclei of the cells.

An interesting observation was that although in many of the smears from testicular exudate no Rickettsiae could be seen, yet the material was highly infective for guineapigs.

As regards reactions in animals it was also possible to place the viruses in 2 groups. The murine typhus virus (Group II) readily infected guineapigs and could be passaged indefinitely, producing a constant or almost constant scrotal reaction. White rats were also readily infected.

As regards Group I the viruses did not readily infect the guineapig, although if large doses of virus from the egg cultures were employed infection occurred and, as a rule, scrotal reaction and enlargement of the spleen was observed, but the viruses were not readily passaged and had to be renewed from time to time from cultures. The virus *b* from the hare was the most virulent of this group for guineapigs but no infection was obtained in rats or mice, whereas with virus *c*, guineapigs were only infected with difficulty but rats showed evidence of infection.

As regards the Weil-Felix reaction 10 rabbits inoculated with murine typhus virus gave a positive reaction with *Proteus OX19*, whereas only one out of 10 rabbits gave any reaction with viruses of Group I and this only in low dilution.

Tests were also carried out to show the duration of the viability of the viruses in the brains of experimental animals. As regards cross immunity experiments, it is emphasized that it is important, in immunity experiments, to carry out many tests in work of this kind ; as a rule for each experiment 6 tests each on 2 animals were used. The results were as follows :—The virus of rat typhus protected animals

against itself and also against the four viruses in Group I. The 4 strains of virus in Group I protected against themselves and also against the other members of the group but did not protect against the virus of rat typhus. These experiments showed that the 4 viruses in Group I, *i.e.* the viruses of African tick bite fever and boutonneuse fever, were immunologically related whereas they were definitely distinct from the rat typhus virus.

The authors suggest that in conformity with PINKERTON's classification the Group I strains of tick bite fever are in the Rocky Mountain fever group and Group II strain of murine typhus in the typhus fever group [see this *Bulletin*, 1936, Vol. 33, p. 907]. *D. H.*

FINLAYSON (M. H.), GROBLER (J. M.) & SMITHERS (R.). **Studies in South African Rickettsiosis.**—*South African Jl. Med. Sci.* 1940. July. Vol. 5. No. 3. pp. 41–45.

Little is known of the vector of African tick bite fever in the Cape Colony. The authors therefore carried out an investigation and collected a large number of ticks; these were divided into batches of 25 to 50 and about 1,000 ticks in all were examined.

From one batch of ticks (*Hyalomma aegyptium*) collected from a cow a virus was isolated by injection into guineapigs; this has now been passaged for 40 generations and produced fever, scrotal reactions and enlarged spleen in these animals. In rats and mice an inapparent infection occurred and there was evidence of the survival of the virus in the brains of rats for at least 30 days. Injection of the virus into rabbits did not produce any evidence of infection and no agglutinins were formed in the blood for any of the strains of *Proteus X* tested. It was found that guineapigs which had recovered from the infection with this virus were not protected against the virus of African murine or louse-borne typhus. On the other hand, animals which had been inoculated with the typhus viruses were protected against the Cape tick virus. The authors consider that this virus isolated from ticks (*H. aegyptium*) collected from a cow in the Cape Colony is probably a tick-bite fever virus, but they also point out that there are points of similarity with the virus of Q fever of Australia and America. *D. H.*

MAIL (G. A.). **The Paralysis Tick** *Dermacentor andersoni* **Stiles. Its Life-History and Control.**—*Publ. Canada Dept. Agric.* Ottawa. 1940. No. 692 (Circ. 161). 4 pp. [Summarized in *Rev. Applied Entom.* Ser. B. 1940. Nov. Vol. 28. Pt. 11. p. 216.]

"Much of the information contained in this brief account of the bionomics, economic importance and control of *Dermacentor andersoni*, Stiles, in Canada has already been noticed from other sources. It is the most important of the 22 species of ticks that have been found in Canada because of its relation to disease (Rocky Mountain spotted fever in man and tularaemia and tick paralysis in both man and domestic animals); it is also the tick that most commonly attacks man in western North America. It is distributed throughout the dry belt of British Columbia, and in southern Alberta and south-western Saskatchewan; it does not occur on the coast of British Columbia or in eastern Canada. The measures recommended for the control of ticks on live-stock include dipping three times at intervals of 10 days, beginning when the ticks first appear in spring; an effective dip is

composed of 24 lb. sodium carbonate, 8 lb. white arsenic, 1 gal. pine tar oil and 500 gals. water. Where a dipping vat is not available and there are only a few animals, dipping fluids may be applied by means of a sprayer. For cattle, a dressing consisting of about 3 parts of raw cottonseed oil or raw linseed oil, mixed with 1 part pine tar oil, applied from the back of the head, along the neck, over the peak of the shoulders and half way along the back, will usually kill most of the attached ticks, prevent reinfestation for some time and help to repel the attacks of blowflies. On horses, ticks often attach themselves under the jaw, on the belly and between the hind legs; it is sometimes advisable to clip the mane before a dressing is applied, since numbers of ticks are sometimes found hidden under the long hair. Whenever possible, stock should be confined in fenced, tick-free pastures during the period of tick activity in the spring months from the latter part of March to the end of June. A method of poisoning rodents on which the immature ticks feed, the symptoms and treatment of tick paralysis and the way in which ticks should be removed from man are described."

CAMPBELL (Eugene P.) & KETCHUM (Walter H.). **Rocky Mountain Spotted Fever. An Analysis of Seven Cases, including One Laboratory Infection.**—*New England Jl. of Med.* 1940. Oct. 3. Vol. 223. No. 14. pp. 540–543. With 2 figs. [15 refs.]

During the years 1931 to 1939 inclusive 7 patients were admitted to the General Hospital in Washington with Rocky Mountain fever; three of these died. Six of the cases were locally contracted and were therefore Eastern State cases, but one, in a medical man, was contracted in the hospital laboratory and was due to the Western States virus of Rocky Mountain fever.

This patient made a good recovery after an illness definitely more severe than that of one of the patients with the Eastern type who was in hospital at the same time, yet as the authors say "the characteristics serving to differentiate these 2 cases were in no way sufficient in themselves to be of general differential value."

As already stated 3 of 6 Eastern type cases were fatal, but of 2,000 cases taken from reviews the fatality rate was in 1,400 Western type cases 19·4 per cent., in 600 Eastern type cases 18·1 per cent. *D. H.*

COHEN (Milton H.). **An Unusual Case of Rocky Mountain Spotted Fever in Southeastern Pennsylvania.**—*Jl. Amer. Med. Assoc.* 1940. Oct. 26. Vol. 115. No. 17. pp. 1441–1442. [14 refs.]

A case of fever with a profuse macular rash and a positive Weil-Felix reaction. Some time after the fever had ceased a sample of blood was taken and this gave strong protection for guineapigs against Rocky Mountain fever virus. The interesting points about this case were that instances of this type are very rare in south-eastern Pennsylvania; the case occurred in December when ticks are not met with, and there was a definite relapse of the fever but without rash 3 weeks after the initial attack. *D. H.*

NICHOLLS (Lucius). **A Case of Tsutsugamushi (Rural Typhus) in Ceylon.** [Memoranda.]—*Brit. Med. Jl.* 1940. Oct. 12. p. 490. With 1 chart.

A European resident in Colombo developed fever 10 days after a shooting trip to the east coast of Ceylon. Severe fever lasted 3 weeks,

a primary sore was noted on the thigh, there was a profuse macular rash all over the body and the Weil-Felix reaction was positive for *Proteus OXK*. In accordance with the work of LEWTHWAITE the case was diagnosed as tsutsugamushi fever, not rural typhus [see this *Bulletin*, 1940, Vol. 37, p. 847]. *D. H.*

LIU (P. Y.) & ZIA (Samuel H.). **Weil Felix Reaction following Typhus Vaccination.**—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 487–494. [10 refs.]

Owing to the prevalence of typhus in Peiping a considerable number of doctors and nurses on the staff of the local hospitals have been inoculated with typhus vaccine. Both the vaccines employed were killed vaccines; one was prepared from infected lice according to the method of Weigl and the other was prepared from tissue cultures of the same virus as that used in the louse vaccine. About 60 per cent. of those inoculated with the louse vaccine gave a strong positive Weil-Felix reaction and 80 per cent. of those inoculated with the tissue culture vaccine did likewise. The blood of some of the staff of the hospital who had not been vaccinated was also tested and it was found that those who had been in close contact with typhus cases also gave a positive reaction and in about the same degree as the vaccinated staff. But it was also found that if the blood of inoculated people was tested before and after inoculation a marked rise in the titre of the Weil-Felix reaction was demonstrated. *D. H.*

PANG (K. H.), LIU (P. Y.) & ZIA (Samuel H.) **Cultivation of Typhus Rickettsiae in Maitland Tissue Culture Medium using Mouse Embryo Tissue.**—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 368–373. [10 refs.]

Five strains of typhus Rickettsiae were cultivated in tissue culture medium using mouse embryo tissue instead of guineapig tunica. The growth obtained was just as good as with guineapig tissue and the organisms after being propagated in this medium for considerable periods were found to have retained their characteristic virulence for the guineapig. The detail of the technique is described and it is similar to that of NIGG and LANDSTEINER except for the substitution of the mouse embryo tissue. *D. H.*

OTTO (R.) & WOHLRAB (R.). Ueber die Auswertung von Rickettsia mooseri-Impfstoffen im Mäuseversuch. (Vergleichende Untersuchungen mit Ri.-Impfstoffen verschiedener Herstellungsart.) [**The Value of the Inoculation with *R. mooseri* as estimated by Research employing Mice. A Comparative Research with Various Other Rickettsial Injection Materials.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1939. Oct. 21. Vol. 122. No. 2. pp. 220–226.

The vaccines employed in these researches were prepared in 3 ways; from intraperitoneal injection into irradiated mice, from cultures on chick embryo membrane and from tissue cultures. These were emulsified and killed by addition of formalin.

The authors found that by employing the intraperitoneal route in mice more delicate protection tests could be carried out than when guineapigs were utilized and the value of the various Rickettsial vaccines could be accurately determined. *D. H.*

FREEMAN (Mavis), DERRICK (E. H.), BROWN (H. E.), SMITH (D. J. W.) & JOHNSON (D. W.). **Studies in the Epidemiology of Q Fever. 5. Surveys of Human and Animal Sera for *Rickettsia burneti* Agglutinins.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1940. Sept. Vol. 18. Pt. 3. pp. 193–200. With 1 fig. [Summary appears also in *Bulletin of Hygiene.*]

The agglutination test with *R. burneti* is a useful means of determining the incidence of infection of man and animals by the virus of Q fever. Agglutinins are present in the serum for varying periods (up to several months) after an attack and even when the infection has been inapparent.

Infection of bandicoots (*Isoodon torosus*) has been noted [see this *Bulletin*, 1940, Vol. 37, p. 563, 851], but the number of such now examined totals 180 and of these 39 have proved positive, indicating that this animal may play an important rôle in the natural spread of the disease. The proportion positive was much higher among bandicoots captured at Cowan Cowan than those on the mainland. The former are highly infested with *Haemaphysalis humerosa*. Other animals tested were opossum (*Trichosurus vulpecula*), the rat kangaroo, the black and other rats, and cattle, from Brisbane and Nambour districts and Imbil. Three rat sera gave agglutination, and that of a cow belonging to a farmer of the Nambour district who had recently passed through an attack of Q fever.

Four hundred and forty-eight human sera were also tested ; 79 were from abattoir workers in Brisbane and 18 of them proved positive, as did 6 out of 64 forestry workers in Imbil. Among 186 militia at Cowan Cowan none reacted—evidence that *H. humerosa* does not readily feed on man. Negative results were also obtained with the sera of 99 aborigines and 20 patients with fever (other than Q fever). [See also *Bull. of Hyg.*, 1938, Vol. 13, pp. 123, 673 ; 1939, Vol. 14, pp. 258, 520 ; 1940, Vol. 15, pp. 668, 669, and this *Bulletin*, 1940, Vol. 37, p. 563.] *H. H. S.*

ANDERSON (W. M. E.). **The Technique of Virus Culture on Chorio-Allantoic Membrane in Military Laboratories.**—*Jl. Roy. Army Med. Corps.* 1940. Oct. Vol. 75. No. 4. pp. 211–222. With 4 figs. [10 refs.] [Summary appears also in *Bulletin of Hygiene.*]

WOODRUFF and GOODPASTURE first demonstrated in 1931 that viruses could be cultivated on the chorio-allantoic membrane of the developing chick embryo. Since that time the technique has been applied to a large number of viruses and has been modified and improved by various workers, especially BURNET. The present report gives a clear detailed account of the technique used at the District Laboratory, Peshawar, in work on sandfly fever. The practical points dealt with *seriatim* are :—the maintenance of a supply of fertile eggs, a suitable incubator, a method of testing for egg fertility, inoculation of eggs, harvesting and grinding of membranes, a crude serum neutralization test, histology of lesions and non-specific lesions.

Thus although the report contains nothing new, and makes no mention of any of the more recent developments of chick embryo virus culture work, it provides all the information necessary for the adoption of a proven technique in military laboratories. A list of essential equipment for the work is given in an appendix.

Wilson Smith.

PATIÑO CAMARGO (Luis). Estado actual de la bartonellosis (fiebre verrucosa verruga) en el continente Americano. [**Bartonellosis in America.**]—Reprinted from *Rev. Facul. de Med. Bogotá.* 1940. Sept. Vol. 9. No. 3. pp. 161–173. With 5 figs. & 1 map.

This article is largely concerned with the Colombian outbreak of bartonellosis in 1936–8, called verruca fever or Guáitara fever, a subject which has been fully described in this *Bulletin* [1940, Vol. 37, pp. 271, 582–84]. The infection is more widespread than has been thought and exists in Colombia, in Peru, Ecuador, and Guatemala. The author records experimental work—injection of Macaca with cultures. Various species of Phlebotomus are abundant in the districts where Bartonellosis occurs, but there is no proof that this is the vector. [In previous publications the louse was suggested but this, also, is not yet confirmed.]

The disease is serious and has a fairly high fatality rate and consequently is a public health problem calling for investigation; the suggestion is made that laboratories should be established for discovery of other, at present unknown, foci, for determining the vector of infection, and what reservoirs of the virus there may be, if any, and to find out whether some method of vaccination against infection can be devised. *H. H. S.*

CHOLERA.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

CHATTERJI (p. 210) shows that in 1938 there was a rise in cholera in Bengal, and that this appears to have been due to floods which were followed by an epidemic; almost 5½ per cent. of provincial deaths were due to cholera. Among permanent anticholera measures improvement of rural water supplies takes a prominent place. BORCAR (p. 211) reports on an outbreak near Goa which was controlled by isolation of the sick and of contacts, and by vaccination and disinfection.

Utilizing their well-known tendency to grow as a film on the surface of peptone water WAKAMIYA (p. 211) describes a diagnostic technique for the rapid isolation of cholera vibrios from faeces. WILSON and REILLY (p. 211) describe a fluid bismuth-sulphite medium, and a saccharose mannitol sulphite bismuth alcohol phenol-red agar medium, which they found to allow rich growth of the true cholera vibrio and to inhibit the growth not only of *coli-aerogenes* organisms but also of many vibrios liable to be mistaken for the true *V. cholerae.*

VENKATARAMAN (p. 212) states, however, that the mannose-bismuth sulphite method of enrichment used in the examination of specimens of water is not capable of yielding a differential isolation of *V. cholerae* since by this method non-agglutinating vibrios could be obtained from almost all tank and river waters examined. Agglutinable vibrios were found to survive at least 74 days in 2 per cent. salt water. He reports that during epidemics in the Cauwery delta, Madras, the vibrios isolated have been of the Ogawa type, but in periods of low incidence the Inaba type has been found.

FOURNIER (p. 212) has studied 1,130 strains of cholera vibrios of epidemic type isolated from stools in Shanghai in 1938. Serologically they belonged preponderatingly to the intermediate Hikojima type, showing characters which have remained constant in Shanghai epidemics since 1921 ; this points to the endemicity of cholera in the Shanghai region. One-quarter of the vibrios possessed some degree of haemolytic power, lost after 2 to 5 months on subculture, thus suggesting the presence of a haemolysin and of a neutralizing substance, which latter makes its appearance rather later than the former in cultures.

By subjecting a typical cholera vibrio to the action of different combinations of choleraphage types VARDON (p. 213) has produced a number of variants of which he has studied the biochemical and serological reactions. His results suggest that the earlier findings of TOMB and MAITRA, that agglutinable cholera vibrios became non-agglutinable in tank waters, may have been due to the presence of bacteriophage in the water, as a similar change is observable in his laboratory-produced variants. Vardon further concludes that phage-infected water vibrios may be assumed to be avirulent, but that if they are able to rid themselves completely of choleraphage infection they will revert to the parent phage-free cholera vibrio which is pathogenic.

In a study of the R and ρ agglutination reactions and agglutinating antigens of *V. cholerae* WHITE (p. 214) found that the major component in the somatic agglutination of these races of vibrios seems to be a heat-stable antigen, resistant to proteolytic digestion and possibly of protein nature. This component includes the polysaccharide haptene Cβ or Cδ, and is possibly to be regarded as the R or ρ antigen proper. There is some reason to suspect that the R and ρ agglutinating antigens furnish the "skeletal system" of the vibrio. He (p. 214) describes a method of obtaining the flagellar fraction from chloroform-treated saline suspensions of R or ρ races of vibrios. The flagellar fraction obtained may be used for flagellar agglutination tests, for fixation of flagellar agglutinins, and for the production of pure flagellar agglutinating sera. He finds no evidence so far of the existence of a flagellar haptene. He (p. 214) also describes the extraction of a heat-stable somatic protein antigen (H.S.S.P.) of *V. cholerae,* which is possibly associated with a haptene Cγ2.

MITRA (p. 215) records the successful use of choleraphage, both as a curative and as a prophylactic agent, in the Province of Bihar.

R. L. S.

BENGAL PUBLIC HEALTH REPORT FOR YEAR 1938 [CHATTERJI (A. C.), Director]. pp. 35–47. With 4 charts & 2 maps.—**Cholera.**

Cholera in Bengal showed a rise in 1938, a rather unexpected rise considering the extensive anticholera measures which had been put into force and the marked drop in cholera mortality of the previous year. The rise, however, need not cause disappointment, as it seems due to the unforeseen occurrence of flood and the epidemic following it. In 1938 nearly 5½ per cent. of the total provincial deaths were due to cholera. Several graphs and maps exhibit clearly the position with regard to cholera for that year and for preceding years. It is satisfactory to note that among permanent anticholera measures that of improvement of rural water supplies takes a prominent place and that increased financial assistance is forthcoming for this purpose. The

urgency of provision of money is to "be determined by the following criteria, *viz* :—(*a*) prevalence of cholera ; (*b*) shortage of drinking water ; (*c*) poorest localities to have preference ; and (*d*), other things being equal, preference will be given to localities offering substantial contributions in money or in labour." *W. F. Harvey.*

BORCAR (Pondorinat A. S.). Epidemia de cólera em Gogolá de Diu. [**An Epidemic of Cholera in Gogola by Diu.**]—*Bol. Geral Med.* Nova Goa. 1940. Apr.–June. Vol. 22. Nos. 4–6. pp. 68–87.

The town of Gogola is in a small Portuguese settlement on the southern extremity of the Kathiawar peninsula and at some distance by sea from the capital of Portuguese Goa. Its inhabitants are mainly fishing folk. Timely intimation of the near-by occurrence of cholera cases enabled the governor to issue orders for a medical delegation to take steps to meet the menace. These instructions were carried out with vigour and were, no doubt, the reason why the outbreak did not assume serious proportions. Owing to the distance from the capital prophylactic vaccine was difficult to obtain at the beginning and vaccinations were confined in the first place to personnel who had to take many risks in carrying out their work. The deficiency was soon made good. Among the controlling measures taken were rapid isolation of the sick in hospital ; immediate evacuation of contact persons ; anticholera vaccination ; disinfection ; domiciliary inspection ; consultation with neighbouring medical authorities ; treatment of the sick. The population involved was over 7,000 and the total number of cases notified was 23, some of them only after death. *W. F. H.*

WAKAMIYA (Shazo). Ueber Wucherungszustände und Agglutination der Cholerabazillen im Peptonwasser. [**Growth Conditions and Agglutination of Cholera Bacilli in Peptone Water.**]—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1940. Sept. Vol. 39. No. 9. [In Japanese pp. 1488–1491. German summary p. 1492.]

In these trials the well known tendency of cholera bacilli to grow as a veil on the surface of peptone water is utilized for rapid diagnosis. Faeces were added to peptone water and from the surface layer of growth transfer was made to 1–200 diluted serum by platinum loop. This was incubated. Cholera vibrios were easy to isolate. The agglutination of the vibrios was also evident. Diagnosis could be carried through in 4 to 5 hours. The reason for this early isolation is furnished by a comparison of growth conditions of *Bact. coli* and *V. cholerae* respectively in peptone water, using colour change in the indicator as evidence for commencing activity. Whereas *V. cholerae* was already active in one hour it took some 3 hours for *Bact. coli* to emerge from a latent growth condition. *W. F. H.*

WILSON (W. James) & REILLY (L. V.). **Bismuth Sulphite Media for the Isolation of** *V. cholerae*.—*Jl. Hygiene.* 1940. Sept. Vol. 40. No. 5. pp. 532–537.

The media introduced originally by WILSON and BLAIR and adopted with modification for the differential isolation of *V. cholerae* from stools and water by READ [this *Bulletin*, 1939, Vol. 36, p. 894] and SEAL [this *Bulletin*, 1940, Vol. 37, p. 278] is further modified by the authors. The media are prepared as follows :—

Fluid medium. (1) Prepare: anhydrous sod. sulphite 20 gm.; boiling water 100 cc. (2) Add bismuth ammonio-citrate scales 0·1 gm.; water 10 cc. (3) Boil. (4) Prepare glucose, saccharose, mannitol or mannose solutions 20 gm. in 100 cc. boiling water. (5) Mix, when cool, the selected sugar solution and the mixture, which will have *p*H 9·4. (6) Keep this mixture as stock. (7) Add, just before use, 10 cc. of sugar-sulphite-bismuth mixture to 100 cc. peptone water of composition: peptone 1; sod. chloride 2; water 100 made to *p*H 9·1 by sod. carbonate solution (sod. carbonate 53: water 400) and 1 cc. absolute alcohol.

Solid medium. (1) Prepare: (*a*) 100 gm. anhydrous sod. sulphite in 500 cc. boiling distilled water; (*b*) 30 gm. bismuth ammonio-citrate scales in 250 cc. boiling water; (*c*) saccharose 50 gm., mannitol 5 gm., water 250 cc. (2) Mix (*a*) and (*b*) and boil 2 minutes. (3) Cool and add (*c*). (4) Add 15 gm. sod. bicarbonate dissolved in 50 cc. cold water to the mixture. (5) Keep as stock mixture. (6) Prepare peptone-agar of composition:—peptone 40 gm., sod. chloride 80 gm., water 4,000 cc., sod. carbonate solution (53 gm./400 cc. water) 40 cc.; autoclave and adjust without filtration to *p*H 8·6. (7) Add to 100 cc. of this alkaline peptone agar, melted and cooled to 50°C., 20 cc. stock mannitol-saccharose-sulphite-bismuth mixture, 2 cc. 1/1000 phenol red and 2 cc. absolute alcohol. (8) Pour plates. (9) Sow test material.

The media have been found useful for the suppression of *coli-aerogenes* organisms, isolation of organisms of the typho-dysentery group, distinctive characterization of *Proteus* and *Str. faecalis* organisms and the promotion of a rich growth of true cholera vibrios, often in sharp contrast with that of El Tor, cholera-like and paracholera strains.

W. F. H.

GUINDY: REPORT OF THE KING INSTITUTE FOR YEAR ENDING 30TH SEPT., 1939. pp. 32–34.—**Cholera (Field) Enquiry** [VENKATARAMAN (K. V.)], **under the Director, King Institute, Guindy.**

In 1936 and 1937 during a time of epidemic prevalence all the cholera vibrios isolated were of Ogawa type. Then in 1938 came a year of low incidence, sporadic cases and limited outbreaks, with change to the Inaba type of vibrio. Now once more in 1939, as was predicted for an epidemic year, it has been found that all of the 30 cultures of vibrio isolated were of the Ogawa type. In examination of water supplies for vibrios at the Institute the mannose-bismuth-sulphite method of enrichment was adopted. Only on one occasion was the agglutinating vibrio isolated but non-agglutinating mannose-fermenting vibrios could be obtained from "practically every tank and river water examined. The mannose-bismuth-sulphite method of enrichment adopted is not capable of yielding a differential isolation of *V. cholerae* under these circumstances."

Some experiments were carried out to determine the period of survival of agglutinable vibrios in salt water and it was found that in a 2 per cent. concentration they could still be recovered up to at least 74 days. *W. F. H.*

FOURNIER (J.). Sur quelques caractères de vibrions cholériques isolés à Changhai en temps d'épidémie. [**Characters of Vibrios Isolated at Shanghai in Time of Epidemic.**]—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 431–438. [18 refs.]

A large number of strains of cholera vibrios were isolated from stools in Shanghai in 1938. These were subjected to some immediate tests,

which are highly important for the proper classification of vibrios ; the vibrios were essentially vibrios of epidemic type. The total number of strains was 1,130 and they all possessed certain definite characters on isolation. They were cocco-bacilli, only produced a pellicle slowly on liquid media and belonged preponderatingly by serological test to the intermediate Hikojima vibrio type. These are characters which have remained constant in epidemics, at least since 1921, and they point to the endemicity of cholera in the Shanghai region. All the agglutinable vibrios isolated belonged to Heiberg's group I (mannose +, saccharose +, arabinose 0) and those that were non-agglutinable could only be divided into groups I and II. With subculture, however, and the appearance of " rough " colonies all the different groups of Heiberg made their appearance. The Voges-Proskauer reaction was consistently negative in the agglutinable vibrios. Serological characters of these 1,130 strains (679 agglutinable and 451 non-agglutinable) have already been recorded [this *Bulletin*, 1939, Vol. 36, p. 895]. Haemolytic power, which is so important for the classification of cholera vibrios, was tested in all the 1,130 strains by adding 10 drops of 5 per cent. suspension of sheep erythrocytes to 2 cc. vibrio suspension. It was found that about one-quarter of the vibrios isolated possessed some degree of haemolytic power. This power appears to be lost after 3 to 5 months with subculture of the agglutinable strains. Such haemolytic power as may be possessed by cholera vibrios seems to be rather restricted and indeed to be present for a short time only. Thus 20 freshly isolated vibrio strains, of which 10 were haemolytic and 10 non-haemolytic, exhibited a " haemolytic phase " period of variable intensity and duration which manifested itself between the 6th and 12th hours of cultivation. These 20 strains were isolated in full epidemic, were agglutinable by Hikojima 0 serum, belonged to Heiberg group I, gave a negative Voges-Proskauer and a positive cholera red reaction, that is to say were true cholera vibrios. This haemolytic phase phenomenon is shown in all the subcultures, apparently quite apart from the passing haemolytic reaction which may be given by some cholera vibrios at the time of isolation. It is explained by the possession by the cholera vibrio of a haemolysin and a neutralizing substance, which latter makes its appearance rather later than the former in cultures. *W. F. H.*

VARDON (A. C.). *Vibrio cholerae* **and Other Vibrios. (Observations on ' Water Vibrios,' with Special Reference to their Variation during Storage in Culture Medium and Possible Relationship to** *Vibrio cholerae.*)—*Indian Med. Gaz.* 1940. Sept. Vol. 75. No. 9. pp. 522–527. [10 refs.]

It will be remembered that TOMB and MAITRA [this *Bulletin*, 1927, Vol. 24, p. 460] came to the conclusion in 1926 that agglutinable cholera vibrios became non-agglutinable in tank waters, became, in fact, " water vibrios." [AHUJA, however, failed to convert agglutinable into inagglutinable vibrios and regarded the evidence of such change, in his experiments, as unconvincing. This *Bulletin*, 1939, Vol. 36, p. 897.] The author has endeavoured to bring about the same result by subjecting a typical cholera vibrio to the action " of different combinations of choleraphage types." A number of variants were thus obtained and both HO and O sera prepared to them. His experimentation has led him to conclude that " Tomb and Maitra's

findings were due to the presence of cholera bacteriophage in the tank waters which resulted in the cholera vibrios becoming non-agglutinable, similar to the variants produced in the laboratory." A further important conclusion is that phage-infected water vibrios may be assumed to be avirulent, " but if they are able to rid themselves completely of choleraphage infection, they will revert to the parent phage-free cholera vibrio which is pathogenic." *W. F. H.*

WHITE (P. Bruce). **A Method of obtaining the Flagellar Fraction of Vibrios.**—*Jl. Path. & Bact.* 1940. Nov. Vol. 51. No. 3. pp. 446–447. With 5 figs. on 1 plate.

It is advisable in this method to use R or ρ races of vibrio, so as to exclude the smooth specific antigen of an S race in preparing flagellar antigen. Flagella are obtained by mixing chloroform with a dense suspension of vibrios which then becomes slimy and enables flagella to be torn from the bacteria by stirring. Centrifugalization, treatment with saturated ammonium sulphate and washing yield a suspension of flagella which may be used for agglutination, for fixation of flagellar agglutinins and for the production of pure flagellar agglutinating sera. The suspensions give an intense biuret, an imperfect Millon and a weak Molisch reaction.

No evidence has been obtained of the existence of a flagellar haptene, nor yet of any serological reaction of flagellar substance in solution. So far " all the observed reactions appear to be in the nature of an agglutination of formed flagella." *W. F. H.*

WHITE (P. Bruce). **The R and ρ Agglutination Reactions and Agglutinating Antigens of** *V. cholerae.*—*Jl. Path. & Bact.* 1940. Nov. Vol. 51. No. 3. pp. 447–449.

The S and R culture forms of organisms are well known. The ρ type is the most degraded of all cholera variants and " the polysaccharide substances contained by this form are common in whole or in part to many vibrios " [this *Bulletin*, 1936, Vol. 33, p. 861]. This communication, preliminary to completion of a study of the antigens of R and ρ *V. cholerae*, is summarized by the author :—

" It would seem that the major component in the somatic agglutination of R and ρ vibrios is a heat-stable antigen which, though it perhaps contains protein, is at least considerably resistant to proteolytic digestion. This component . . . includes the polysaccharide haptene Cβ or Cδ. It is possibly to be regarded as the R or ρ antigen proper. But the somatic agglutinating apparatus of the variants seems to present other antigenic components. . . Since they appear to be totally inactivated by proteolytic enzymes they are probably of protein nature. Possibly they are combined with the proteolysis-resisting component in a single complex. There is some reason to suspect that the R and ρ agglutinating antigens . . . furnish the ' skeletal system ' of the vibrio." *W. F. H.*

WHITE (P. Bruce). **A Heat-Stable Somatic Protein Antigen (H.S.S.P.) of** *V. cholerae.*—*Jl. Path. & Bact.* 1940. Nov. Vol. 51. No. 3. pp. 449–451.

The extraction of a heat-stable somatic protein antigen (H.S.S.P.) is now described, in which R and ρ cultures of *V. cholerae* were used to avoid complication introduced by smooth specific S antigen.

Moreover, the originally described Cγ haptene is subdivided into Cγ1 and Cγ2, of which the latter is present in the fraction H.S.S.P. According to the author's summary the fractions which have now been separated from the vibrio bodies are :—(1) A heat-labile somatic protein antigen (H.L.S.P.) referred to in a previous abstract [this *Bulletin*, 1940, Vol. 37, p. 720] ; (2) A heat-stable somatic protein antigen (H.S.S.P.), possibly associated with a haptene Cγ2 ; (3) An alcohol-soluble "Q protein" fraction [this *Bulletin*, 1936, Vol. 33, p. 374] ; (4) The differential agglutinating S, R and ρ antigens with their respective polysaccharide haptenes Cα, Cβ and Cδ [this *Bulletin*, 1936, Vol. 33, p. 861]. Another haptene, Cγ1, is probably also of somatic origin, while yet another, the rugose haptene [this *Bulletin*, 1940, Vol. 37, p. 719] has been derived from the intercellular secretion of rugose cultures. A method has been given for separating the vibrio flagella [see above]. Antibodies for all these components occur, or may occur, in the sera of rabbits immunized with living cultures of *V. cholerae*. *W. F. H.*

BIHAR, PROVINCE OF : ANNUAL PUBLIC HEALTH REPORT YEAR 1938 & ANNUAL VACCINATION REPORT YEAR 1938–39 [MITRA (S. L.), Director]. [**Cholera** p. 31.]

"*Field Work on Choleraphage.*—The use of choleraphage was introduced in this province nine years ago. The results of its use both as a curative agent as well as a prophylactic agent appeared to be highly encouraging and since then its use has been extended to the province in an increasing degree. It is now definitely found that its use as a curative agent gives the best results even in the rural areas when used in early stages of the attack, but when dehydration has taken place and collapse has set in, its use needs supplementing with transfusion of saline. As a prophylactic agent it invariably cuts short the epidemics, provided immediate steps are taken to phage the total population exposed to the infection."

MERTENS (W. K.) & BEEUWKES (H.). **Haemolysis Experiments with Cholera-, El Tor and Celebes Vibrios.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1940. Vol. 29. No. 1/2. pp. 10–26. [11 refs.]

This is an English version of the paper abstracted in this *Bulletin*, 1940, Vol. 37, p. 721.

LEPROSY.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

BUKER (p. 217) found a leprosy incidence of 6·1 per cent. in 128 villages in Kengtung, but, whereas in the Shan villages the incidence was 3·6, in the Lahu villages it was as high as 14·2 per cent. These figures are higher than those previously found and the increase is attributed to famine conditions.

DHARMENDRA and LOWE (p. 217) have not been able to confirm the work of ADLER and of SERGENT on the infection of Syrian hamsters with human leprosy. In 23 animals no generalized or progressive

infection was found, but since bacilli were present in the implanted nodules for many weeks, the authors cannot exclude the possibility of multiplication at the site of implantation. From some of the animals the spleens were removed before the implantation or intraperitoneal injection of the leprotic material. ARAUJO (p. 218), however, reports successful infection of *Cricetus cricetus* with material from human lepromata; bacilli were found in the blood, liver, spleen, kidneys and axillary glands four weeks after the inoculation.

ITAKURA (p. 218) found microscopical (but not macroscopical) leprosy lesions in the gums and the dental pulp of lepers.

BÜNGELER and FERNÁNDEZ (p. 219) describe the histological changes in tuberculoid leprosy in the stage of reaction, either spontaneous or induced by the injection of lepromin. Epithelioid cells are found, with subsequent necrosis and fibroid changes, but there are few bacilli. Tuberculoid leprosy is the result of hypersensitization, and there is a high degree of immunity. NOLASCO (p. 220) found tuberculoid changes at the site of lepromin injections in 4 of 5 patients who showed strong reactions, in 3 of 16 with weak reactions and in none of 18 who failed to react. In the strongly reacting cases suppuration took place. OBERDOERFFER and COLLIER (p. 220) report that, in tuberculoid leprosy, atrophy of bone is shown by X-ray to be most marked in those bones which are supplied by the nerves most frequently damaged by the disease. In lepromatous disease the atrophy is most marked in the distal phalanges. The disturbances of nutrition which cause these changes are probably due to the inactivation of muscles and the authors therefore advise the purposive training of the muscles concerned. RODRIGUEZ and WADE (p. 220) report a case of tuberculoid leprosy in which bullae appeared, leading to ulceration. The same authors (p. 221) describe three cases intermediate between tuberculoid and lepromatous disease.

ARAUJO (p. 221) found the first leprotic lesions to be maculae in 38·7 per cent., and dysaesthesiae in 27·2 per cent. of 975 cases (mostly children) studied in Rio de Janeiro. STEIN (p. 221) describes a follicular condition of the skin consisting of specific granulomata, with lepra cells and bacilli, which destroy the hair follicles and which may form the starting points for lepromata. The condition is relatively common. LOWE and CHATTERJI (p. 222) report three cases which commenced with the neural form of leprosy but in which lepromatous lesions rapidly developed.

ARCHER (p. 222) reports a marked increase in lepra reactions which occurred shortly after the vaccination, against smallpox, of the inmates of a leper home. All the reactions, some of which were severe, occurred in vaccinated persons.

The Committee on Leprosy Skin Tests (p. 222) reports failure, with antigens from leprous spleens, to obtain skin reactions of any value in diagnosis. Extracts of normal spleens gave approximately similar results. HENDERSON (p. 222) also records failure along these lines.

HOFFMANN (p. 222) issues a warning against diagnosing leprosy on the finding of acid-fast bacilli in nasal mucus or in ulcers, without supporting clinical findings. These bacilli may be saprophytes from water or soil and may have no pathological significance. They may not always be morphologically distinguishable from leprosy bacilli.

In discussing the basic principles of treatment, MUIR (p. 223) urges the importance of strengthening and stimulating the tissue cells,

by improving the general health, to act more vigorously against the bacilli. Drug treatments are also discussed. He (p. 223) writes on the treatment of the nasal condition in leprosy. Saline irrigations (with ephedrine if there is much catarrh) are advised, and for lepromata cauterization with 10 per cent. trichloracetic acid after local anaesthesia.

ARAUJO (p. 224) gives an account of the leprosy preventoria in Colombia.

SARDJITO (p. 224) describes the process of immunization of sheep with the Siddik strain of acid fast-bacilli.

NONAKA (p. 224) states that human or rat leprosy material injected into chickens produces leprous changes locally, and sometimes in the internal organs, which are more extensive than when the same material has been heated before injection. Rat leprosy bacilli, however, soon lose their infectivity in chickens. KUDICKE (p. 225) has studied the action of a number of esters of chaulmoogric and hydnocarpic acids on rat leprosy. At best only retardation of the lesions was obtained, but the drugs deserve further study. *C. W.*

BUKER (Richard S.). **Leprosy in Kengtung, Southern Shan States, Burma. Report of the Survey in 1939–40.**—*Leprosy in India.* 1940. July. Vol. 12. No. 3. pp. 78–82.

Kengtung has a population of about 300,000, half of whom are Shans. A leprosy survey in 1939–40 of 128 villages revealed an incidence of 6·1 per cent., 609 cases among slightly less than 10,000 examined. The Shan villages showed a rate of 3·6 per cent., the Lahu villages the high incidence of 14·2 per cent. and one Chinese village revealed no cases. Among the Shans 37·6 per cent. of the cases were of the lepromatous type. These figures show an increase on previous ones, and this is attributed to famine conditions. There was noted an inverse relationship between the numbers suffering from enlarged spleen in this malarious area and those afflicted with leprosy. Colocasia is eaten to some extent by the people, but it was not possible to say which of the tribes eat most. Leprosy here is considered to be a very serious and increasingly great health problem, but the State now has ten leper colonies accommodating a total of 1,100 patients on a voluntary basis. *L. Rogers.*

DHARMENDRA & LOWE (J.). **Attempts at Transmission of Human Leprosy to Syrian Hamsters.**—*Indian Jl. Med. Res.* 1940. July. Vol. 28. No. 1. pp. 61–69.

The authors report on attempts to infect 23 Syrian hamsters, some previously splenectomized, by intraperitoneal injection or subcutaneous transplantation of a human leprosy nodule. Two of the animals died in three weeks, two lived eight months and the rest were killed between the ninth and twelfth months. In only two of the whole number were slight microscopical lesions and bacilli found elsewhere than in the nodule at the site of injection, in the form of slight enlargement and congestion of the local lymph nodules in two of the six animals dying early, within three weeks. In two other animals a few bacilli without visible lesions were found respectively in an inguinal gland and in the omentum. It is therefore concluded that although the bacilli can persist in the implanted nodule for long periods, and the possibility of their multiplication therein cannot be excluded, the inoculation of the bacilli by either method used has not

been followed by a generalized or progressive infection. The authors are thus not able to confirm the reports of ADLER and of BURNET that the Syrian hamster is susceptible to human leprosy. [See this *Bulletin*, 1938, Vol. 35, p. 293; 1939, Vol. 36, pp. 240, 539.] *L. R.*

ARAUJO (H. C. de Souza). Inoculação positiva da lepra humana no hamster (*Cricetus cricetus*) com bacillemia. [**Successful Inoculation of** *Cricetus cricetus*, **with Human Leprosy.**]—*Brasil-Medico.* 1940. Apr. 6. Vol. 54. No. 14. pp. 249–252. With 2 figs.

The author records that in September 1939 he received ten adult hamsters, *C. cricetus*, from Dr. Evandro Chagas. Five he inoculated with 2 cc. of an emulsion from a human leproma, intraperitoneally and subcutaneously in the right axilla. One died on the 37th day afterwards but "nothing abnormal was observed at autopsy." On the 75th day the other four were re-inoculated with 2 cc. of an emulsion of another leproma subcutaneously in the right axilla. Four weeks later one of them showed an ulcer at the angle of the mouth and was emaciated and a few days later became paraplegic. Blood was taken from the heart before it was killed, and smears showed numerous lepra bacilli, in small groups, as did smears from the liver, spleen, kidneys and the axillary glands. Examination was made also for the presence of some virus but no indication of such was obtained. The other hamsters inoculated are still under observation.

Five more were similarly inoculated with 2 cc. of emulsion of liver and spleen of a rat infected with Stéfansky's bacillus (murine leprosy). One escaped, a second died on the 85th day but nothing abnormal was detected, except that small numbers of the organisms were seen in smears from the axillary glands. On the 117th day another died; in smears from the testicles and spleen some of the bacilli were seen, but none in the other viscera. The remaining two were killed on the 129th day; they were well nourished and showed no skin lesions. In one there were a few bacilli in the axillary glands, lungs, spleen and kidneys; thus in three of the four examined bacilli in small numbers were found. [See also this *Bulletin*, 1938, Vol. 35, p. 293; 1939, Vol. 36, p. 539; 1940, Vol. 37, pp. 331, 627.] *H. H. S.*

ITAKURA (Teiju). **The Histo-Pathological Studies on the Teeth of the Lepers, especially on its Pulp-Tissue.**—*Acta Japonica Med. Trop.* Formosa. 1940. Mar. Vol. 2. No. 1. pp. 105–166. With 14 figs. (2 coloured). [24 refs.]

——. **The Histo-Pathological Studies on the Teeth of the Lepers, especially on Gingiva and Other Supporting Tissues of the Teeth.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1940. Aug. Vol. 39. No. 8. [In Japanese pp. 1214–1237. With 2 figs. & 2 plates. English summary pp. 1237–1239.]

These papers record the results of three years of study of the histology and pathology of the teeth in leprosy. In the case of the gums no macroscopical lesions were noted, but microscopically typical leprous lesions were observed in the mucous membrane in 66·67 per cent. of lepromatous and in 12·26 per cent. of nerve cases, and in 38·89 of the whole *Myco. leprae* were found, most frequently in the lepromatous

type. In the dental pulp typical leprous affections were found in 32·58 per cent., including teeth presenting no abnormal naked eye appearances. The lesions were most frequent in lepromatous cases and in the frontal group of teeth, especially the central incisors. Coloured teeth were not especially frequently involved. The pericementum was diseased in as many as 50 per cent., most often in lepromatous cases. The dental alveoli, especially the medulla, were involved in 50·85 per cent. including 61·36 per cent. of lepromatous, but only 2 per cent. of the neural type. It was mostly slight or medium in extent with no special incidence. *L. R.*

BÜNGELER (W.) & FERNÁNDEZ (J. M.). Untersuchungen ueber den klinischen Verlauf und die histologischen Veränderungen allergischer Reaktionen bei der Lepra. [**Researches on the Allergic Reactions in Leprosy.**] I. Mitteilung. Klinische und histologische Untersuchungen ueber die Leprolinreaktion nach Mitsuda.—*Virchows Arch. f. Path. Anat. u. Physiol.* 1939. Nov. 16. Vol. 305. No. 1. pp. 236–260. II. Mitteilung. Klinische und histologische Untersuchungen ueber die spontane Reaktion der tuberkuliden Lepra.—*Ibid.* Dec. 27. No. 2. pp. 473–493. With 19 figs. III. Mitteilung. Klinische und histologische Untersuchungen ueber die Künstliche Aktivierung der tuberkuliden Lepra.—*Ibid.* 1940. Feb. 2. No. 3. pp. 593–608. With 12 figs. [Numerous refs.]

The first part of this comprehensive article is an amplification, with additional illustrations, of a paper of Fernández already reviewed. [See this *Bulletin*, 1940, Vol. 37, p. 632.]

Part II deals with clinical and histological researches on spontaneous reactions in tuberculoid leprosy, which is very mild in comparison with the lepromatous form, and is characterised by the presence of epithelioid cells and very few bacilli. Two hundred cases were studied in all stages of reaction. A recent reaction in an old lesion shows congestion and marked oedema, especially of the papillary layer of the skin, together with small-celled infiltration around the blood vessels and the hair follicles, followed by connective tissue degeneration and necrosis. The old foci are usually free from lepra bacilli, which are destroyed owing to the high degree of immunity in tuberculoid cases.

Part III deals with the clinical and histological appearances met with in the case of artificially induced reactions in tuberculoid leprosy; it contains a number of illustrations. Subcutaneous injections of standardized lepromin were used for inducing the reactions, which were followed locally within 24 hours by swelling and roseolar eruptions and surrounding hyperaemia, accompanied by local heat and a burning sensation. After two to three weeks the typical late reaction shows local swelling, which may result in discharge of pus leaving a pigmented scar after a month.

The histological changes are very similar to those described in Part II above, beginning with oedema and round-celled infiltration, especially around the hair follicles and sebaceous glands, and distinct mobilization of the histiocytes and epithelioid cells with vacuolation, and followed by connective tissue degeneration, as a rule with absence of lepra bacilli. Later, necrosis and ultimately fibroid changes result. The authors conclude that tuberculoid leprosy is essentially a state of permanent hypersensitization, with a high degree of immunity against leprosy infection. *L. R.*

BÜNGELER (W.). Die allergischen Reaktionen bei tuberkulider Lepra. [**Allergie Reactions in Tuberculoid Leprosy.**]—*Klin. Woch.* 1940. Mar. 30. Vol. 19. No. 13. pp. 299–302.

The author discusses this question in the light of the literature, and of microscopic examinations he has carried out with very similar results to those recorded in recent papers from the Philippines. The latter are not referred to, presumably because they have not yet reached Germany. [See this *Bulletin*, 1940, Vol. 37, p. 631.] *L. R.*

NOLASCO (J. O.). **The Lepromin Test in Lepra Reaction. II. Histology of the Reaction Lesions and Persistence of the Injected Bacilli.**—*Internat. Jl. Leprosy.* Manila 1940. July–Sept. Vol. 8. No. 3. pp. 285–298. With 10 figs. on 3 plates. [13 refs.]

The author reports on the histology of the sites of lepromin tests in 35 lepromatous cases (lepers in the state of lepra reaction) and six non-reaction control cases (lepers not in the state of reaction), the area being removed from 21 to 49 days after the test injections. Of five cases giving two-plus reactions, four showed histological tuberculoid changes, but only three of sixteen one-plus reactions and none of eighteen non-reacting cases showed such changes. The injected bacilli were found in large numbers in 28 of 34 negative and one-plus cases and in large or fairly large numbers in two-plus reactions. In two-plus reactions suppuration occurred with numerous bacilli in the pus, but few in the surrounding tuberculoid tissue. *L. R.*

OBERDOERFFER (M. J.) & COLLIER (D. R.). **Roentgenological Observations in Leprosy.**—*Amer. Jl. Roentgenology & Radium Therapy.* 1940. Sept. Vol. 44. No. 3. pp. 386–395. With 15 figs.

The authors report and illustrate their observations on the X-ray appearances in a number of leprosy cases divided into nerve (tuberculoid) and lepromatous types. In tuberculoid leprosy they found the bone atrophy most marked in those bones the muscular insertions of which are supplied by the nerves most frequently damaged by the disease, namely the ulnar, median at the wrist, peroneal and the posterior tibial at the ankle. In lepromatous cases the atrophy is earliest and most extensive in the distal phalanges. They assume that the disturbances of nutrition which cause these changes are due to the inactivations of muscles inserted into the bones concerned as the result of nerve destruction. They therefore advise the purposive training of the muscles concerned as likely to prevent these end results, and they support the orthopaedic recommendations of Dow. The differences in the bone changes in the two types are of some diagnostic value. The essential change in the bones of mutilated hands and feet is atrophy of the ivory and cancellous tissues in various degrees.

L. R.

RODRIGUEZ (J. N.) & WADE (H. W.). **Bullous Tuberculoid Leprosy. Report of a Case, with a Discussion of Lazarine Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1940. July–Sept. Vol. 8. No. 3. pp. 333–344. With 4 figs. on 1 plate. [12 refs.]

This is an illustrated account of a positive tuberculoid case in which there suddenly appeared numerous bullae, followed by ulceration leading to the formation of a mixture of pigmented, achromic and spotted scars, such as old writers called lazerine leprosy. *L.R.*

WADE (H. W.) & RODRIGUEZ (J. N.). **Borderline Tuberculoid Leprosy.** —*Internat. Jl. Leprosy.* Manila. 1940. July–Sept. Vol. 8. No. 3. pp. 307–331. With 19 figs. on 5 plates. [19 refs.]

The authors discuss the question of the transformation of tuberculoid leprosy into the lepromatous type in the light of three cases, which they describe in detail. They were characterized by repeated mild reactions which yielded numerous leprosy bacilli when in the acute stage. Histologically they were intermediate between the two forms, but they have not become lepromatous, although their prognosis remains uncertain. They may easily be mistaken for the lepromatous form when the bacilli become numerous in them. *L. R.*

IGNACIO CHALA (J.). Sobre un caso de lepra tuberculoide. [**A Case of Tuberculoid Leprosy.**]—Reprinted from *Rev. Facul. de Med. Bogotá.* 1940. Sept. Vol. 9. No. 3. pp. 121–136. With 11 figs. [21 refs.]

ARAUJO (H. C. de Souza). A lepra infantil na Colombia. Séde e typos das lesões iniciaes. [**Leprosy in Children in Colombia. Site and Type of Initial Lesions.**]—*Brasil-Medico.* 1940. Mar. 9. Vol. 54. No. 10. pp. 145–151. With 4 figs., & 4 graphs. [15 refs.]

The author has recently examined 852 children at the Leprosarium de Agua de Dios, who were believed to be free from leprosy. Of the total, 413 were boys and 439 were girls. It has long been held that the earliest sign of leprosy is a macula—some colour change of the skin—and next to this some alteration of sensation. Among 975 cases studied by the author in a Rio de Janeiro leprosarium, maculae were the first lesions in 38·7 per cent., dysaesthesiae in 27·2 per cent. To determine the site of the initial lesion the author gives details of twenty cases in children ranging in age from 3 to 13½ years. In one the first noticed lesion was a sarcoid of Boeck situated in the right iliac region in a female child of 2½ years. In the others there were maculae of very varied distribution—face, arm, leg, buttock, thigh, depicted or indicated in a series of line drawings. Nothing definite can be inferred from these, but it may be said that, speaking generally, they indicate larger and perhaps more numerous lesions on the lower limbs [see also this *Bulletin*, 1939, Vol. 36, p. 533.] *H. H. S.*

STEIN (A. A.). **Specific Affections of the Follicular Apparatus of the Skin in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1940. July–Sept. Vol. 8. No. 3. pp. 299–306. With 5 figs. on 2 plates.

The author describes a peculiar affection of the follicular structure of the skin, which he does not think has been previously noted, although he met with it in no less than 33 per cent. of his cases. It manifests itself clinically as yellowish-brown, somewhat sunken follicular spots with atrophic epithelium. Histologically specific granulomata with lepra cells and bacilli are found, which rapidly destroy the hair follicles and the hairs. These lesions may form starting points for the formation of lepromatous granulomata, and are seen principally on the lower extremities. *L. R.*

LOWE (J.) & CHATTERJI (S. N.). **Onset of Leprosy with Localised Lesions rapidly becoming Lepromatous.**—*Leprosy in India.* 1940. July. Vol. 12. No. 3. pp. 112–114. With 3 figs. on 1 plate.

Three cases are recorded which commenced with the neural type of the disease with erythematous patches, together with anaesthesia and thickening of nerves, but in which, within a short time, lepromatous lesions containing numerous lepra bacilli developed. In the authors' experience a considerable number of cases either start in a lepromatous form, or else develop into that form in a very short time. The cases are illustrated by photographs. *L. R.*

ARCHER (G. B.). **A Brief Note on the Effect of Vaccination for Small-Pox on Leprosy.**—*Leprosy in India.* 1940. July. Vol. 12. No. 3. p. 112.

The author reports an instance of the well-known leprous reactions following vaccination against smallpox of the 900 inmates of the Purulia Leper Home in India in consequence of a patient who had been on leave developing the infection. In the fortnight before the vaccinations eleven cases of lepra reaction had been observed, about the average number. In the fortnight after, 41 reactions of a more severe type than usual were noted, all in patients in whom the vaccination had taken successfully. *L. R.*

i. INTERNATIONAL JOURNAL OF LEPROSY. 1940. July–Sept. Vol. 8. No. 3. pp. 263–269. **Skin Reaction Tests with Tuberculin-Type Extracts of Leprous Spleens.** By the Joint Committee on Leprosy Skin Tests, Philippine Bureau of Health and the Leonard Wood Memorial.

ii. HENDERSON (Howard J.). **An Attempt to obtain Specific Protein Antigens from Leprous Spleens.**—*Internat. Jl. Leprosy.* Manila. 1940. July–Sept. Vol. 8. No. 3. pp. 271–283. [13 refs.]

These papers record negative results from carefully carried out experiments which should be brought to the notice of other workers.

i. The Committee have continued their attempts to find a test for leprosy comparable with the tuberculin test in tuberculosis in the absence of cultures of the leprosy bacillus. For this purpose they made three solutions of antigens made from the spleens of fatal leprosy cases, but most of the reactions to their injection subsided within twenty-four hours, and the comparatively few positive reactions occurred in the contact group. Further the reactions to normal spleen extracts were usually about as marked as to those derived from leprous spleens. In no case were late lepromin-like reactions met with at the end of two weeks. They conclude that the extracts of leprous spleens tested did not contain substances that produce specific reactions in persons infected with leprosy.

ii. This paper reports tests with the spleen antigens prepared on similar lines from spleens rich in leprosy bacilli, also with negative results. Those interested should refer to the original papers for details of the preparation of the antigens used. *L. R.*

HOFFMANN (W. H.). **On the Limits of the Bacteriological Diagnosis of Leprosy.**—*Jl. Trop. Med. & Hyg.* 1940. Sept. 16 & Oct. 1. Vol. 43. Nos. 18 & 19. pp. 234–236; 243–245.

This experienced observer stresses the difficulty in diagnosing leprosy with certainty from the mere finding of acid-fast bacilli, owing

to the frequency with which non-pathogenic acid-fast bacilli originating in the soil or water may gain access to the human system and be present in the nasal or urinary secretions as well as in the mouth. These may sometimes have a similar morphology to the bacillus of leprosy, but in other cases can be distinguished from leprosy bacilli by their morphology or by being easily cultivated on ordinary media. He narrates cases with gangrenous limbs which were admitted to a leper hospital on account of the presence in the ulcers of acid-fast bacilli differing in their morphology from those of leprosy, and which he thought might have been saved by amputation. He could, however, get no surgeon to undertake the necessary operation because the patients had been in a leper hospital. He quotes in confirmation of his own work observations of Dr. A. Recio, who found saprophytic acid-fast bacilli in the saliva of 40 consecutive healthy persons by centrifuging and staining by the Ziehl-Neelsen method, often confirmed by positive cultural methods in milk or on solid media. Leprosy should not, therefore, be diagnosed in the absence of clinical symptoms merely on the strength of finding acid-fast bacilli in ulcers or in human secretions. *L. R.*

Muir (E.). **Some Basic Principles in Leprosy Treatment.**—*Leprosy Review.* 1940. Oct. Vol. 11. No. 4. pp. 162–169.

After emphasizing the high resistance of the tissues with intense cellular reaction in nerve cases, compared with the absence of resistance in the lepromatous type, the author states that in the latter type the two objectives are to strengthen and stimulate the tissue cells to act more vigorously in breaking down the defence of the bacilli. These principles are the basis of his oft recommended measures to improve the general health by regular exercise, etc. Local applications of caustics, such as trichloracetic acid, intradermal injections of hydnocarpus oil, the exact action of which is not fully understood, and nutritious diet are also advised. Potassium iodide, in small doses at first, is stated to have a specific effect in breaking down the defence mechanism of the bacilli. Fluorescine in 10 grain doses daily for seven months, methylene blue, 4 grains for six months, or trypan blue, 4 grains for over one month, are also recommended, but he does not advise massive doses of these dyes. *L. R.*

Muir (E.). **Intranasal Treatment in Leprosy.**—*Leprosy Review.* 1940. Oct. Vol. 11. No. 4. pp. 173–175.

The author advises (1) mild antiseptic treatment on the lines recommended by Parkinson; namely irrigation of the nasal cavities with normal saline with the aid of a pipette while the patient lies sideways on a couch. If there is much nasal catarrh 0·9 per cent. ephedrine hydrochloride should be added to the saline. (2) If there is severe sepsis with pus and crusts, the same treatment is advised with longer retention of the saline to soften the crusts, or sodium sulphate may be used up to 10 per cent. strength. (3) For dealing with leproma, cauterization with trichloracetic solution is advised in a 10 per cent. solution after the mucous membrane has been anaesthetized with a spray of 2 per cent. novocaine, and repeated after two weeks. Treatment diminishes the discharge of lepra bacilli from the nose. *L. R.*

ARAUJO (H. C. de Souza). Os preventorios anti-leprosos da Colombia. [**Leprosy Preventoria in Colombia.**]—*Brasil-Medico.* 1940. Mar. 16. Vol. 54. No. 11. pp. 173–177.

The first part of this article is of historical interest. A lazaretto was established at Caño de Loro in 1795 with patients transferred from Cartagena; another lazaretto, de Contratación, was founded in Santander in 1861, and that of Agua de Dios in the Department of Cundinamarca in 1870. In these are housed 8,200 lepers. A census in July 1938 showed that there were 2,341 children under 5 years of age living with their leprous parents, 1,193 in Contratación and 1,148 in Agua de Dios, just 30 per cent. of the leprous population of these places.

At the present day there are in Contratación: (1) The "Guadalupe" preventorium, for 250–350 healthy children of lepers. In 1938 there were 257. (2) The "San Bernardo" preventorium, inaugurated in April 1936 for 250 healthy children. To-day there is accommodation for 400 and at times it is full. As an annex to this is (3) a *crèche* for those under 5 years. In Agua de Dios, there are two preventoria (1) The "Nazareth," founded in 1935 with 50 beds, in 1938 enlarged to 125 and now with 200; (2) "Santa Helena" for female children [number not stated]; and (3) a *crèche* which in March 1939 had 43 infants. More crèches are to be asked for to house infants born of leper parents so that they may be cared for from the very beginning.

H. H. S.

SARDJITO. Immunisatie van schapen met zuurvaste bacillen, stam Sidik, geïsoleerd uit een lepra-patiënt. [**Immunization of Sheep with the Sidik Strain of Acid Fast Bacilli Isolated from a Leper.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Nov. 12. Vol. 80. No. 46. pp. 2717–2722. English summary (9 lines).

"A method is given to immunise sheep against acidfast bacilli strain Sidik, isolated from a leprosy patient Sidik.

"The best result is obtained by injections subcutaneously about every 2 weeks with increasing doses of glycerin broth culture.

"The sheep-immune-serum has a higher titer of complement fixation power against alcoholic extract of acidfast bacilli strain Sidik than the antileprosy serum of Reenstierna.

"This complement fixation reaction is to be used for testing antileprosy serum for therapeutic qualities."

NONAKA (Nobu). **Studies on the Infection of Chickens with Leprosy.**——*Kitasato Arch. Experim. Med.* 1940. July. Vol. 17. No. 3. pp. 175–201. With 16 figs. on 4 plates.

The results are recorded of the repeated injection of human and rat lepromata into chickens. The author concludes:—

"1. When fresh emulsion of human lepra tissue was inoculated to chickens the majority of them showed an increase of leprous granulation. Sometimes the liver and spleen also showed leprous changes. The acid fast organisms were always seen in the leprous tissues at the site, but the viscera where leprous changes had taken place showed only a few organisms.

"2. Only mild leprous changes were produced in the second generation and the number of the organisms was also small. The test for transplantation for third generation was negative.

"3. The changes produced by heated emulsion at the site of inoculation were mild and localised and they disappeared quickly. No viscera showed any changes.

"4. When an emulsion of rat lepra tissue grown in white rats was inoculated to chickens marked leprous granulation was produced in all the fowls, but only seldom the viscera were involved.

"5. The leprous changes produced in the second generation were milder than those of the primary infection and seldom the organism was seen. No viscera were involved.

"6. When heated emulsion of rat lepra tissue grown in rat was inoculated the changes produced at the site were mild and localised, and disappeared quickly. No viscera showed any change.

"7. Since the rat lepra bacilli inoculated to chickens appeared to have lost their infectivity quickly, the leprous granulating tissue grown in chicken was emulsified and inoculated to white rats to determine the recovery of pathogenicity. It was found that the tissue taken within one week after inoculation showed pathogenicity, but that over ten days showed hardly any pathogenicity in the first generation, but when it was retransplanted for the second time the leprous granulation was marked. Those of over 15 days showed entirely negative results.

"8. Non-pathogenic acid fast organisms do not produce any leprous changes in chicken. If any change was produced it was rather pseudo-tubercular in form." *L. R.*

KUDICKE (R.). Experimentelle Untersuchungen zur Behandlung der Lepra. [**Researches on the Treatment of Leprosy.**]—*Med. Welt.* 1940. Jan. 13. Vol. 14. No. 2. pp. 30–35. [21 refs.]

The author reports on a long series of experimental trials of various preparations on white mice infected with rat leprosy by subcutaneous injection of the causative bacilli. The lesions produced in these animals are flat, raised infiltrated areas, which may go on to ulceration in the neighbourhood of the groin or axilla, and the degree of infection at given dates is estimated by the average size of the lesions in the treated as compared with the untreated, and the presence of bacilli in the lesions was ascertained by puncturing them. The substances tested are arranged in three classes. The first group includes various esters of chaulmoogric and hydnocarpic acids and some other compounds. Those with which material retardation of the development of the leprous lesions was obtained were Isopropylbenzyl ester, glycolcinnamic acid ester, glycolacidchaulmoogryl ester and the sodium salt of monochaulmoogryl-glycerinphosphoric acid. In the second group, of cinnamon preparations, the most effective were cinnamic-acid-olein ester, cinnamon-glycol-chaulmoogryl ester, cinnamon allylauryl-ethyl ester and ricinol-acid-chaulmoogryl ester. The third group includes chaulmoogric esters with which a radicle of Rhodanid has been combined, which has been found to have a lethal action on tubercle bacilli. The best results of the whole series in the three groups were obtained with chaulmoogryl-rhodanid plus chaulmoogryl-cholin-rodanid and with oleylrhodanid. It is only claimed that retardation of the progress of the leprous infections was obtained, but the more active preparations are considered worthy of further study, as any drugs that increase the resistance of animals to leprotic infections are likely to prove of value in the treatment of the human disease. *L. R.*

MALARIA.

Précis of Abstracts in this Section.

Haynes (p. 227), in a paper chiefly devoted to the symptomatology of the malaria epidemic in Nairobi in 1940, states that malaria admissions to hospital in the first six months of the year numbered 2,251, with a case mortality rate of 1·22 per cent., as compared with 1,289 malaria admissions in the corresponding months of 1935, which was also a year of high malaria incidence in Nairobi. There was one case of blackwater fever.

Covell (p. 228), in his annual report on current investigations and research at the Malaria Institute of India in 1939, records that *A. minimus* has been found to be the chief vector in the U.P. Terai, where spraying of dwellings with pyrethrum insecticides has given promising results against this species. In the Wynaad, S. India, where *A. fluviatilis* is the only important vector, precipitin tests have shown that 96·9 per cent. of 1,681 of these mosquitoes contained human blood, as compared with only 1·4 per cent. of 350 *A. fluviatilis* caught in the U.P. Terai. This indicates that the *A. fluviatilis* from these two areas, though showing no morphological differences in either egg, larval or adult stages, belong to different biological races. In Bengal Iyengar (p. 228) shows that *A. minimus*. *A. philippinensis* and *A. sundaicus* are the important vectors in the hills, plains and delta respectively. Russell and Rao (p. 228) discuss the habitat and association of species of anopheline larvae in Madras. Capon (p. 229) shows that in Baluchistan malaria transmission takes place up to an altitude of about 7,000 feet.

During the latter part of the dry season of 1938 Shannon and de Andrade (p. 229) made a survey in Brazil, mainly devoted to the Jaguaribe watershed in Ceará and to the coast between Fortaleza and the frontier of Rio Grande do Norte, to delimit the zone of *A. gambiae* infestation. They report that the more immediate threats of further extension to favourable breeding grounds are apparently to the Fortaleza region, to the Araripe Mountain region, and to the Iguatu plain. The greater part of Upper North-east Brazil, to which *gambiae* is at present confined, is generally unfavourable for breeding, as is, in part, the Jaguaribe River basin in Ceará. *A. gambiae* appears to prefer small bodies of sun-exposed water to large bodies, and selects sand-lined pools rather than mud-lined water deposits. It avoids vegetation. During the dry season the chief breeding sources are man-made shallow wells and irrigation ditches.

Castro (p. 230) describes a rapid method of staining thick blood films with Giemsa stain for the diagnosis of malaria.

Heisch (p. 230) discusses 35 cases of mild dysentery associated with malaria in Africans treated at the Native Hospital in Nairobi. Dysentery bacilli were isolated from seven, and *E. histolytica* from one. No dysentery organisms were isolated from the remaining 27, and although it was not possible to determine whether or not malaria was responsible for the dysenteric symptoms, these in most cases responded rapidly to quinine treatment. Ro and Yugawa (p. 230) describe the case of a patient admitted to the Hospital for Infectious Diseases, Taihoku City, with a diagnosis of typhoid fever, who was subsequently

found by blood examination to have a heavy infection with *P. falciparum*. The patient died comatose.

PAKENHAM-WALSH and RENNIE (p. 231) found that sulphathiazole (M. & B. 760), 2 gm. thrice daily, administered to a general paralytic inoculated with *P. vivax*, reduced the parasite count from 90 to 4 per hundred fields after the first day's treatment. The count remained at a fairly low level for nine days before quinine was given.

BARROWMAN (p. 231) discusses malaria control on estates. The half-mile rule, though excellent as a starting point in control, is not absolute and must be used with reference to local conditions. Chemotherapeutic control will probably not succeed if the population under treatment exceeds 100, and certain strains of malaria parasites do not respond to atebrin. STRAHAN (p. 231) points out that on some estates, where the half-mile zone has been efficiently controlled, *A. maculatus* still reaches the lines in numbers sufficient to spread the disease. He advocates chemo-prophylaxis where other methods have failed and the trapping of adult mosquitoes in the lines. If *A. maculatus* is found, the control area should be extended.

In northern Bengal, RAMSAY and ANDERSON (p. 232) have found that for efficient work, siphons giving a prolonged flush are more effective against *A. minimus* than those which give more frequent but shorter flushes. Large reservoirs are therefore necessary and should give a total discharge of not less than 50,000 gallons for each mile of channel 6 to 8 feet wide. WORTH and SUBRAHMANYAM (p. 232) discuss two types of automatic siphons used for flushing streams in Ceylon.

Criticism of afforestation as a means of drying swamps has led HOPKINS (p. 233) to set out the advantages claimed for afforestation and drainage of swamps over drainage alone. He describes how it should be carried out and what it does. In Uganda afforestation with *Eucalyptus robusta* against *A. gambiae* and *A. funestus* has proved a cheap and effective measure. Some indigenous species of *Ficus*, or mango, are useful shade trees for ditches.

JOHN (p. 233) shows that the top minnow *Apocheilus lineatus*, common in Travancore, is actively larvivorous and prefers mosquito larvae to other aquatic organisms. In wells it may completely control mosquito breeding.

CHOPRA *et al.* (p. 234) found that the leaves of *Tephrosia vogelii* are not useful in larvicide preparations.

WATS and BHARUCHA (p. 234) describe the apparatus they have found most useful for insecticide sprays in houses. *C. W.*

HAYNES (W. S.). **The Malaria Epidemic.**—*East African Med. Jl.* 1940. Sept. Vol. 17. No. 6. pp. 216–221.

Judged by the number of admissions to the Native Hospital and Infectious Diseases Hospital the malaria epidemic in Nairobi in 1940 has been of unusual severity. During the first six months 2,251 cases of malaria were admitted to these hospitals, as compared with 1,289 admitted to the Native Hospital in the corresponding months of 1935, which was another year of unusual malaria severity. The case mortality rate was 1·22 per cent. There was one case of blackwater fever. The paper is concerned chiefly with symptomatology.

Norman White.

INDIA. **Annual Report of the Malaria Institute of India for the Year 1939** [COVELL (G.), Director].—16 pp. 1940. Delhi: Manager of Publications. [Annas 10 or 1*s*.]

This report is a record of a year's successful work and continued usefulness. To the malariologist, of chief interest will be the sections dealing with current investigations and research. These, however, call for but small notice here. The results of these inquiries are nearly all published in the Institute's admirable journal and are duly summarized in this *Bulletin*. Attention might perhaps be directed to one or two points of interest. Further investigation in the U.P. Terai has confirmed the belief that *A. minimus* is the chief vector in this region: in Bazpur an infectivity rate of 18 per cent. was recorded for this species at the height of the malaria season. Here, too, the spraying of dwellings with pyrethrum insecticides has given encouraging results: none of the *A. minimus* collected in sprayed villages was found infected with malaria parasites. The number of mosquitoes dissected, however, was comparatively small.

Another observation of interest concerns *A. fluviatilis*. This species is the only important vector in the Wynaad, South India. Precipitin tests showed that 96·9 per cent. of 1,681 *A. fluviatilis* from the Wynaad contained human blood. The stomach-contents of only 1·4 per cent. of 350 *A. fluviatilis* from the U.P. Terai reacted positively with anti-human serum. No morphological differences have been detected in either the egg, larval, or adult stages of *A. fluviatilis* caught in these two areas respectively but it is clear that they belong to two quite different biological races. *N. W.*

IYENGAR (M. O. T.). **Further Observations on Vectors of Malaria in Bengal and Notes on the Seasonal Infectivity of Anopheles.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 115–123.

The author has previously reported the results of the dissection of a large number of Anopheles from different parts of Bengal [see this *Bulletin*, 1939, Vol. 36, p. 1005]. The results of the examination of another 11,425 Anopheles caught in dwellings in 14 localities in Bengal are now recorded. Of the 16 species examined natural infection was found in five, *A. philippinensis*, *A. minimus*, *A. annularis*, *A. varuna* and *A. sundaicus*. The sporozoite rate of *A. philippinensis* was 3·9, of *A. minimus* 9·3, and of *A. sundaicus* 5·3 per cent., the total infection rate of these three species being 6·3, 18·6 and 15·8. The important vectors of malaria in Bengal are *A. philippinensis* in the plains, *A. minimus* in the submontane area and *A. sundaicus* in the deltaic area. The infectivity of *A. philippinensis* was highest from September to November: the infection rates of *A. minimus* were high from June to September. *N. W.*

RUSSELL (Paul F.) & RAO (T. Ramachandra). **On Habitat and Association of Species of Anopheline Larvae in South-Eastern Madras.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 153–178. With 3 charts & 19 figs. on 10 plates.

This paper contains a wealth of detailed information concerning anopheline larvae collected during two years in the town and taluk of

Pattukkottai in the Tanjore district of southern Madras. More than 140,000 larvae, in 6,033 collections, were taken from wells, tanks, ricefields, waste irrigation water, irrigation canals and channels, borrowpits, ditches, seepage and spring pools, rain-water pools, hoofmarks, etc. The species of larvae in order of abundance were *A. culicifacies, subpictus, varuna, pallidus, hyrcanus, annularis, vagus, jamesi, stephensi, barbirostris, tesselatus* (16 specimens) and *aconitus* (one specimen). An interesting table shows the percentage of times each species was taken in association with each of the other species. This association, indicating similar habits, was most marked between *A. culicifacies* and *A. subpictus*; *A. hyrcanus* and *A. pallidus*; and between *A. annularis* and *A. jamesi*. *A. stephensi* was the most exclusive species. Excellent photographic illustrations show types of all the most important breeding places. *N. W.*

CAPON (P. J. L.). **A Brief Investigation regarding the Height above Sea-Level at which Malaria occurs in Baluchistan.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 125–127.

An outbreak of malaria occurred among British troops encamped at Kahan Tangi in Baluchistan, 6,500 feet above sea-level. Previously it was thought that the altitude precluded the possibility of malaria transmission. The author made an inquiry in a number of villages situated at heights varying from 6,200 to 8,000 feet: spleen examinations were made and sick persons were examined. It would appear that in this region malaria transmission ceases at a height of about 7,000 feet. *N. W.*

SHANNON (R. C.) & DE ANDRADE (Gastão César). **Dry Season Observations on the African Mosquito, *Anopheles gambiae*, in Brazil in 1938.** —*Amer. Jl. Trop. Med.* 1940. Sept. Vol. 20. No. 5. pp. 641–668. With 10 figs. (1 map).

"1. The greater part of Upper Northeast Brazil, the region in which *gambiae* is at present confined, is generally unfavorable for the breeding of this species.

"2. In Ceará *gambiae* was found only in the Jaguaribe River basin, and the invasion of this basin, especially in the upper reaches, was far from complete owing, in part, to the unfavorable conditions existing here.

"3. The more immediate threats of further extension to highly favorable breeding areas are apparently: (*a*) To the Fortaleza region by natural breeding or by train and highway transportation; (*b*) to the Araripe Mountain region by train and highway transportation; (*c*) to the Iguatú plain, by natural extension along the Jaguaribe, or by auto or train.

"4. Observations indicate that *A. gambiae* prefers small bodies of sun-exposed water to large bodies. Sand-lined pools are apparently selected in preference to mud-lined water deposits. Waters with vegetation are avoided.

"5. During the dry season the chief breeding sources in this semiarid country are created by man: *Cacimbas* or shallow wells, excavated in and near the wetter portions of the river beds to supply water for household and agricultural purposes, and the irrigation ditches in the areas with subterranean and seepage waters."

[See also PINTO, this *Bulletin*, 1940, Vol. 37, p. 498.]

CASTRO (Guillermo). **The Rapid Diagnosis of Malaria from Thick Blood Smears.**—*Jl. Lab. & Clin. Med.* 1940. Sept. Vol. 25. No. 12. pp. 1308–1310.

A quick staining method for thick blood films is described. Smear a large drop of blood in a circle of about half an inch in diameter near the end of a slide. Place the slide on a hot plate, at about 50°–[illegible] C.: the blood will dry in less than a minute. Make a semicircle with a wax pencil enclosing the blood between the pencil mark and the end of the slide. To 3 drops of old distilled water add 1 or 2 drops of Giemsa's stain: this is sufficient to cover the area of the slide enclosing the blood. Stain for 3 to 5 minutes. Wash gently in a washing tray containing tap water, or preferably old distilled water, submerging the slide horizontally, moving it backwards and forwards and removing it slowly. Drain off the excess water, and stand the slide almost vertically on the hot plate. Directly the smear begins to lose its moist appearance it should be removed from the hot plate: further heating causes decolorization. The result is that of the usual well stained thick blood film. The smears must be fresh. With an increasing interval between the taking of the blood and staining, the stain loses its ability to dehaemoglobinize the red cells. Poor results are obtained with blood taken more than twelve hours before staining.

NW.

HEISCH (R. B.). **Malaria and Dysentery.**—*East African Md. Jl.* 1940. Sept. Vol. 17. No. 6. pp. 225–229.

The author discusses 35 cases of dysentery associated with malaria that were treated in the Native Hospital in Nairobi. The dysentery was of a mild type. Dysentery bacilli were isolated from seven of these cases and *Entamoeba histolytica* from one. Whether malaria was responsible for the dysenteric symptoms it was not possible to determine; in many cases, however, the administration of quinine was followed by prompt alleviation of these symptoms. *NW.*

RO (Mantoku) & YUGAWA (Hukasi). **Protozoological Observations on a Severe Case of Malaria Tropica, with Many Schizonts in the Peripheral Blood, Clinically Mistaken for Typhoid Fever.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1940. Sept. Vol. 39. No. 9. [In Japanese pp. 1493–1499. With 1 chart. [19 refs.] English summary p. 1500.]

The patient whose case is here recorded was admitted to the Hospital for Infectious Diseases, Taihoku City, with a diagnosis of typhoid fever, presumably on account of his history of fever and his cowsy condition. Examination of the blood revealed a red cell count of 4,170,000, white cells 10,600 per cmm., haemoglobin 83 per cent., colour index 1·0 [not 0·9, as stated]. A differential leucocyte count gave lymphocytes 19, large mononuclears 7·5, neutrophiles 73 per cent. Smears showed a heavy infection with *P. falciparum* (25,597 in 1 cmm. of blood, it was estimated), in all stages of development. The patient died comatose. [In the English summary, no mention is made of any autopsy to prove that death was due to cerebral malaria; nor is there any mention of Widal or cultural tests to exclude enteric fever. The two diseases may, and in some countries do, co-exist and

that not rarely. See this *Bulletin*, 1916, Vol. 8, p. 32; 1919, Vol. 14, pp. 218, 264; 1920, Vol. 15, p. 252; 1921, Vol. 17, p. 221; Vol. 18, p. 136; 1928, Vol. 25, p. 400; 1929, Vol. 26, p. 925; 1936, Vol. 33, p. 798.] *H. H. S.*

PAKENHAM-WALSH (R.) & RENNIE (A. T.). **Sulphathiazole in Malaria.**—*Lancet.* 1940. Oct. 19. p. 485. With 2 figs.

The authors publish a graph illustrating the effect of sulphathiazole (M. & B. 760) on the rigors and parasites of a general paralytic who had been inoculated with *P. vivax*. The maximum dose used was 2 gm. thrice daily. After the first day's treatment the parasite count fell from 90 to 4 per hundred fields, and remained at a low level for nine days when quinine was given. *N. W.*

BARROWMAN (Barclay). **Some Random Reflections on Estate Medical Practice.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1940. June. Vol. 4. No. 1. pp. 1–12.

This is a presidential address to the local branch of the British Medical Association. It is concerned for the most part with malaria control. Being based on large practical experience the reflections are all interesting, but being random they do not lend themselves to summary in small space. The half-mile working rule for mosquito-breeding control, and recent criticism as to the inadequacy of the rule, are discussed. It remains "the most important starting point in malaria control. It must, however, be used intelligently. It is not a panacea for all difficulties. There is no such thing in malaria control." Sub-soil drainage, especially fascine drainage, is discussed; in thick clay outcrops fascine drainage is superior to pipe drainage. If timber has to be imported pipe drainage is preferable: pipes are less bulky and so more easily transported.

Malaria control is the work of the practising health officer and not of the research laboratory.

Some interesting observations were made regarding *A. ludlowi* malaria and the special circumstances in Malaya in which *A. barbirostris* may become an important vector of malaria. With regard to chemotherapeutic control of malaria the author considers that such control is unlikely to be very successful if the population under treatment exceeds a hundred; the case rate and the death rate may well be reduced but such reduction cannot compare with that obtained by anti-mosquito measures. There are certain strains of malaria parasites which do not respond to atebrin. These few points may serve to indicate the scope of a stimulating address. *N. W.*

STRAHAN (J. H.). **A Review of the Results of Malaria Control on Rubber Estates in Negri Sembilan South from 1931–1939.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1940. June. Vol. 4. No. 1. pp. 53–65. With 12 graphs.

This study is based on the returns and reports concerning the health conditions of the estate population of Negri Sembilan South, over a period of nine years. The malaria death-rate of this population is 3 or 4 times as great as that of the Federated Malay States as a whole; for the Indian population only, this rate is from 4 to 6 times as high. One quarter of estate Indians who died in the F.M.S. died in these

districts, of which the Indian population is but 5 per cent. of the total Indian population employed. The author briefly describes the conditions on seven of these estates. Nearly everywhere there is intensive breeding of *A. maculatus*. In some estates oiling has been conscientiously carried out but there has been a rigid dependence on the half-mile oiling zone for protection. Reasonable control has not been established : an adequate number of *A. maculatus* reach the lines from outside the protected area. The author recommends that where the measures adopted have failed seriously, chemo-prophylaxis should be given a trial. Adult mosquito trapping should be used in the lines ; if *A. maculatus* be found, the control area should be extended, by the use of cover, fascine drainage where possible, and flushes. *N. W.*

RAMSAY (G. C.) & ANDERSON (Ian R.). **An Investigation on the Use of Automatic Siphon Sluices on a Group of Tea Estates in Northern Bengal.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 93–97.

In 1939 MACDONALD described a flushing siphon which he used with success in Ceylon for the control of anopheline breeding [see this *Bulletin*, 1939, Vol. 36, p. 926]. This siphon has been tried out on a group of tea estates in Northern Bengal. The average annual rainfall in Northern Bengal is over 200 inches and most of this falls between June and September. The foundations of the first lot of siphons installed were washed away. In other attempts on sandy soil the water above the dam disappeared and reappeared some ten yards downstream. Constructional alterations surmounted these difficulties but it was found that the discharge of the Ceylon siphon, 475 gallons per minute, in a channel 2 feet wide, had little effect on the breeding of *A. minimus*, if there were but little fall. A "Dooars" siphon was accordingly constructed, on similar lines but with four times the capacity. These siphons work well. The paper describes a method of estimating the number of siphons required for a water channel. A prolonged flush controls a greater length of channel than more frequent shorter flushes : large reservoirs are therefore required. A total discharge of 50,000 gallons is the minimum amount necessary to control a mile of a channel 6 to 8 feet wide. The Dooars siphon is heavy and so is not transportable but its local construction is not difficult and not costly. *N. W.*

WORTH (H. N.) & SUBRAHMANYAM (K.). **Anti-Larval Flushing of Rivers and Streams in Ceylon.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 81–92. With 3 figs. & 2 plates.

Two types of automatic siphons are described. The "Block" type is constructed of cement concrete blocks cast from a standard mould, prepared on the site, the siphon unit forming part of the dam. The defect of this form of construction is the lack of curves in the internal ducts of the siphon ; impaired efficiency arising therefrom has to be compensated by increased capacity. The "Funnel" type is constructed also of cement concrete cast *in situ*, and also forms part of the dam : in this type sharp corners are eliminated and the ducts are graduated. The paper describes the action of five such siphon installations in dams varying in width from 20 to 64 feet. The effects of the flushing on the channel and on larvae are described. When working

with a head of from 40 to 25 inches it should be possible to control a total distance of 5,000 feet below the dam. The cost of a battery of siphons and dam, complete, works out at from Rs.20 to Rs.25 per foot of width of river dammed. Stone pitching of banks up to normal flood level is necessary for some distance above and below the dam. Where the dry weather flow is very low, and where accessibility to the site permits, hand-operated gates may be preferable to automatic siphons. *N. W.*

HOPKINS (G. H. E.). **Afforestation as a Method of drying up Swamps.**—*East African Med. Jl.* 1940. Aug. Vol. 17. No. 5. pp. 189–194.

The author protests against generalizations that have been made as to the inefficiency of afforestation as a means of drying up swamps. He claims that in Uganda, and probably in other parts of Africa where the main conditions and the malaria vectors, *A. gambiae* and *A. funestus*, are the same, afforestation is a cheap and effective method of reducing the breeding of anophelines. Swamps in Uganda are either papyrus-swamps or grass-swamps; the latter are more dangerous. Though breeding of the two vectors therein may not be intensive, the large size of such swamps may make even diffuse breeding important. The desiderata of afforestation are that the swamp should be dried, leaving a minimum number of ditches which should be heavily shaded. Afforestation of the main part of the swamp is done with some species of *Eucalyptus*: *E. robusta* is the species normally most useful in Uganda. Some preliminary drainage is generally necessary. The spacing of the trees should be such as to produce the maximum leaf area, not the maximum amount of saleable timber. Usually a considerable number of the original ditches will become dry: the remainder must be heavily shaded. Some indigenous species of *Ficus*, or mango, are useful shade trees. A few residual pools are commonly left: these should be filled if possible. The first cost of afforestation is fairly heavy but the revenue obtainable from poles and fuel compensates for this. It may make a profit. [Afforestation in Kenya and Uganda was discussed by JAMES, this *Bulletin*, 1930, Vol. 27, pp. 631–634]. *N. W.*

RANDLE (Thomas A.). **New Developments in Underground Drainage for Malaria Control.**—*Amer. Jl. Public Health.* 1940. July. Vol. 30. No. 7. pp. 736–742. With 7 figs.

JOHN (C. C.). **Observations on the Utility of *Aplocheilus lineatus* (Cuv. & Val.) for Mosquito Control.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 67–80. [11 refs.]

This is a record of observations on the life history and feeding propensities of *Aplocheilus lineatus*, one of the Indian top minnows. Its congener *A. panchax*, which is abundant in Bengal, Orissa, Burmah, Thailand and Malaya, is markedly larvivorous: it is not found in the peninsular part of India, where it is replaced by *A. lineatus*. The latter is very abundant in the coastal plains of Travancore where the observations recorded were carried out. *A. lineatus* is carnivorous and shows a very decided preference for mosquito larvae even in waters rich in other forms of aquatic organisms. It remains active in

wells of various kinds in which it completely controls mosquito breeding. It is very adaptable and very hardy. In the laboratory an *A. lineatus* devours on the average 80 mosquito larvae in nine hours.

N. W.

CHOPRA (R. N.), ROY (D. N.) & GHOSH (S. M.). **Insecticidal and Larvicidal Action of** *Tephrosia vogelii.*—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 185–189.

The leaves of *Tephrosia vogelii* have been used as an insecticide in Rhodesia; their toxic action is due to tephrosin and deguelin which they contain. The possibility of using this plant as an auxiliary mosquito larvicide was suggested by D. MANSON [see this *Bulletin* 1939, Vol. 36, p. 1,009]. The authors obtained a supply of fresh leaves from Assam. They found that the dried powdered leaf had no larvicidal or insecticidal properties. The larvicidal properties of a kerosene extract of the leaves was essentially due to the vehicle and could not be ascribed to *Tephrosia*. An acetone extract in high dilution possesses well marked larvicidal properties but the high cost of acetone precludes its wide application in the field. *N. W.*

WATS (R. C.) & BHARUCHA (K. H.). **The Choice of Mechanical Sprayers for Mosquitocides Sprayed for Antimalarial Purposes.**—*Jl. Malaria Inst. of India.* 1940. June. Vol. 3. No. 1. pp. 129–136. With 1 plate.

This is a description of an investigation into the relative efficiency of various types of apparatus that could be used for mosquitocide sprays. In huts and dwellings that cannot be rendered relatively air-tight it is important to be able to secure a maximum concentration of the pyrethrin or other preparation in the minimum of time. The Phantomyst did not give good results. For large scale operations the AMCO Atomizer No. 4 is recommended. This is an apparatus used for humidifying industrial plants. The atomizer consists of a tubular nozzle with separate inlets for compressed air and the fluid. The fluid inlet is controlled by a built-in device which prevents atomization until the compressed air pressure has risen to 30 to 35 lbs. Lengths of rubber hose connect the nozzle with an insecticide container strapped to the operator's back, and to a petrol-driven air-compressing outfit conveniently carried on a small hand cart.

N. W.

MISCELLANEOUS.

DHONDY (B. S.). **Automatic Flyproof Latrine Seat.**—*Indian Med. Gaz.* 1940. Aug. Vol. 75. No. 8. pp. 466–468. With 4 figs. [Summary appears also in *Bulletin of Hygiene.*]

In the opinion of the author the general idea that fly-breeding occurs mainly in manure and rubbish heaps, while probably true in cold climates and in countries well managed from the point of view of sanitation, is not true of tropical countries such as India. In these

countries human excreta from the time it is voided to the time of its final disposal, affords a favourable medium for fly-breeding. As a result of careful observation the author considers that if human faeces are exposed to flies and eggs are laid in them, no amount of trouble at the point of disposal, *e.g.*, a trenching ground, will prevent the eggs hatching out. In his view the point at which most of the eggs are laid is in the latrine receptable, and therefore, in order to be fully effective, measures for the prevention of fly-breeding must begin at this point.

Many efforts to meet this necessity have been made in the past, the idea being to ensure the receptacle being closed and fly-proof, except when actually in use. Generally the appliances devised for this purpose have included working parts more or less complicated, or they have required some amount of manipulation objectionable to adults and too difficult for children. For these and other reasons they have gone out of use.

The fly-proof latrine " seat " here described is designed to deal as effectively as possible with fly exclusion at the latrine. It consists of an iron framed stand and platform made to fit over an oblong container. The floor of the platform is provided with a suitable opening and a couple of " mobile foot-rests," one on each side of the opening. These foot-rests are connected by levers and vertically rotating pulleys to a couple of sheet metal lids centred on pivots which fit closely along the top edges of the sides of the container. When the latrine is not in use the lids effectively close the container. Pressure on the foot-rests raises the lids from the centre to an angle of about 80 degrees from the horizontal and into a position under the platform where they cannot be fouled. When the foot-rests are released the lids return to the closed position by their own weight.

It is claimed for this device that the mechanism is simple in construction, fool-proof, and automatic in action. Figures are not given, but the cost is said to be " low."

In addition to the detailed description, four illustrations are given, but these, being photographs, hardly suffice to give a clear idea of the mechanism. *Henry H. Clay.*

SULLIVAN (W. N.), GOODHUE (L. D.) & FALES (J. H.). **Insecticide Dispersion. A New Method of dispersing Pyrethrum and Rotenone in Air.**—*Soap.* New York. 1940. Vol. 16. No. 6. pp. 121, 123, 125. With 2 figs. [Summarized in *Rev. Applied Entom.* Ser. B. 1940. Dec. Vol. 28. Pt. 12. pp. 239–240.]

"As the development of methods for the rapid vaporisation or dispersion of relatively non-volatile insecticides would broaden the range of materials that could be used as fumigants, and as Goodhue and Sullivan have recently found that smoke from burning derris and pyrethrum has considerable fumigating action on the house-fly [*Musca domestica*, L.] but that the burning destroys much of the material before it can be dispersed, a better method of dispersion was sought. In preliminary tests, rapidly boiling solutions of derris and pyrethrum in different solvents produced some toxic vapours, but sprinkling pure rotenone on a hot surface was more effective, and slowly dropping solutions of rotenone and pyrethrum oleoresin in different solvents on a

hot surface gave still better results. There was considerable spattering, but this was overcome by directing a spray of the solution against the heated surface. The results of investigations on the effect on the house-fly of pure rotenone and pyrethrum oleoresin applied separately or in combination in this manner are reported. The solvent used was safrol, with which a copious fog, or aerosol, is produced on account of its high boiling point. Per 100 cc. of solution, 2 gm. rotenone or commercial pyrethrum oleoresin having a total pyrethrin content of 25·1 per cent., or 1 gm. of each, was used. The apparatus consisted of an atomiser with the nozzle mounted 7 ins. above the centre of an electric hot plate, which was kept at about 375°C. [707°F.]. A small electric pump was used to maintain the air pressure. The tests were made in a furnished room with a capacity of 1,100 cu. ft. and a temperature of 28–30°C. [82·4–86°F.] in which about 150 flies were liberated and 10 cc. solution was sprayed for each test. 'Knockdown' was estimated after 10 minutes, and the flies were removed to a cage and fed after an exposure of 1 hour. In two tests, the percentages of flies down after 10 minutes and dead after 48 and 72 hours were 100, 72 and 74 with pyrethrum oleoresin, 15, 65 and 83 with rotenone and 90, 81 and 95 with equal parts of the two. There was a mortality of 4 per cent. in the untreated control, and the effect of safrol alone was slight. There was no visible deposit, but the odour was noticeable. When about 500 adult mosquitos of the genus *Culex* from 2 to 3 days old were exposed for 10 minutes to the mist produced by 20 cc. of a solution containing 100 mg. pyrethrins in ethyl alcohol, all were down within 5 minutes and 99 per cent. were dead after 48 hours. No males survived. Carbon dioxide under pressure was used in the atomisation to reduce the risk of fire and the formation of aldehydes. Rotenone and pyrethrum applied in this form gave little or no mortality of large nymphs and adults of the American cockroach [*Periplaneta americana*, L.]. The manner in which dispersion is accomplished is discussed. To obtain the same mortality by burning as by spraying a hot surface, about 20 times as much material is required. Other advantages of the dispersion method are that under favourable conditions the insecticide will remain in suspension in air for several hours, less solvent is required than for spraying, there is practically no deposit, and toxic action is accelerated."

HERTIG (Marshall). **Glass Tubes for rearing Phlebotomus and Other Insects.**—*Science.* 1940. July 26. Vol. 92. No. 2378. pp. 91–92. With 1 fig.

"All methods of rearing sandflies in the laboratory involve keeping the engorged females at a high degree of humidity in a vessel with a moist inner surface on which the eggs may be laid." The authors fill one end of a tube (of length 8 cm. and bore 8–9 mm.) with plaster of Paris, which extends into the tube for 10–12 mm. The open end is stoppered with cotton. These tubes may be made in quantity by standing bundles of cut tubing in dishes of freshly mixed plaster. Before use the plaster is moistened by contact with wet cotton and when containing sandflies the tubes are stored, plaster end down, in moist earthen pots or in pans with a thick bottom layer of plaster. The highest degree of moisture short of condensation on the glass walls

is desired. Eggs may be immersed in water and transferred to a breeding pot by pipette.

These tubes may also be used as containers for transporting sandflies and for the breeding of fleas. *C. W.*

PUBLIC HEALTH REPORTS. 1940. July 19. Vol. 55. No. 29. pp. 1312–1314. **Chigger Mites.**

The Chigger Mite of America must not be confused with the Chigoe or Jigger of the tropics. The former is the larval form of one of the Trombidiidae, known now as *Leptus rileyi* [it has had many synonyms], the latter is the flea, *Tunga penetrans*. It is with the former that the present paper deals. It is oval in shape, red in colour, 150μ broad when unfed, legs and body surface covered with feathered hairs. The adult is not parasitic. Eggs are laid in the ground and hatching takes place when the warm spring weather sets in. The mites are widespread—from Long Island to Mexico and from the Atlantic Coast to the Rocky Mountains. The larvae attack domestic animals, small mammals, birds and reptiles, as well as man. They attach themselves to the skin, especially where this is thin or folded ; they do not burrow and, when fully engorged, drop off. They inject a liquefying secretion which causes intense itching, followed by weals and papules, and perhaps vesicles. Secondary infection may be set up by scratching. They are not known at present to transmit any disease, but if the lesions are numerous they may cause fever, headache and nervous disturbances from the pruritus and loss of sleep.

The local application of kerosene or of 95 per cent. alcohol rapidly kills the larvae, but they move rapidly over the skin and are not easy to find. A lather of soap left on will give some relief, or an application of collodion with metaphen, which not only relieves the itching, but also prevents infection. Prevention consists in sprinkling the clothes with flowers of sulphur if it is necessary to pass through weeds, tall grass or heavy undergrowth. *H. H. S.*

NIÑO (Flavio L.) & RIVAS (Carlos I.). Nota parasitológica a propósito de una observación de miasis forunculosa por larva de "*Dermatobia hominis*." [**A Case of Human Myiasis due to the Larva of** *Dermatobia hominis* (*cyaniventris*).]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1940. Apr.–May. Vol. 16. No. 133. pp. 214–219. With 8 figs.

A woman of 49 was basking in the sun, clothed in a bathrobe, when she felt a prick on the internal aspect of the lower third of the left thigh. It caused some itching, and in the course of the ensuing days a redness appeared, with some swelling to the size of a pigeon's egg. An abscess developed and at the end of a week a larva was abstracted whose measurements and description are given and it was identified as that of *D. hominis*. *H. H. S.*

SAPOEAN. Ontjomvergiftiging in het onderdistrict Tjikidjing (Reg. Madjalengka). [**Ontjom Poisoning in Tjikidjing (Madjalengka).**] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Mar. 5. Vol. 80. No. 10. pp. 598-601.

Ontjom is a preparation of peanut press cake, made from *Arachis hypogaea*. Two occurrences of toxic effects following its ingestion are

recorded. In the first a widow and her five children were attacked; the oldest and the youngest died, the mother and the other three children were taken to hospital and recovered. In the second, a woman and two children were attacked; her husband and two others living in the house had none of the incriminated food and remained healthy. One of the children died early; the mother and the other child were taken to hospital, but both died the same evening. Investigation discovered two other victims, one was already dead, the other dying.

It appears that there are varieties of "ontjom," the ordinary ontjom kedele and the ontjom boengkil or ontjom onggok prepared from it. It is the latter which causes the poison symptoms. In mild cases these are diarrhoea and a splitting headache for two days, after which recovery takes place, the diarrhoea having eliminated the toxic material. In severe cases, the early symptoms are the same, but five days later there ensues an exhausting vomiting and continuance of the headache, though the diarrhoea has abated. Consciousness is retained till coma supervenes shortly before death. The pulse is a little quickened, 100–120, or in children 130 per minute, of good tension and regularity, till late when it becomes quick and small. Some icterus of the conjunctivae is visible.

By the time the patient comes under observation most of the offending material will have been eliminated from the intestine by the diarrhoea and vomiting, and treatment is mainly symptomatic—cardiac stimulants, glucose by mouth and *intra venam.* *H. H. S.*

BAYLEY (H. H.). **Injuries caused by Scorpion Fish.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. Aug. 16. Vol. 34. No. 2. pp. 227–230. With 1 fig.

Two species of Scorpaenidae occur in the West Indies, *S. plumieri* and *S. grandicornis* [other species elsewhere, *S. diabolus* in the Indian Ocean and tropical Pacific, together with *Synanceia verrucosa* in the former and *Synanceia brachio* in the latter; *S. porcus* in the Mediterranean. *S. brasiliensis* has occasionally set up poisoning when eaten]. Poisoning is produced by contact; according to the author the poison may be in the small mucus-secreting glands of the skin, but the more widely held view is that the poison is injected into wounds made by the dorsal spines. [SCOTT in his article on Fish Poisoning in the Tropics (BYAM and ARCHIBALD's *Practice of Medicine in the Tropics*, Vol. I, p. 795) states: "The poison apparatus, though connected with the dorsal fin, is not the same in all the varieties. Thus, in the Synanceia mentioned above, before the poison can escape an enclosing membrane must be broken, whereas in the Scorpaena the poison apparatus is practically in direct communication with the exterior.

"The poison glands of both are situated at the base of the dorsal spines, but in the former the spines are grooved and a membrane makes this groove into a sac, and the poison cannot escape until the sac is ruptured, whereas in the latter the spines are channelled with an opening near the tip."]

The symptoms produced are early onset of excruciating pain soon extending up the limb, profuse perspiration, pallor, dyspnoea, and

tachycardia. There may be vomiting and diarrhoea and, after 24 hours, a morbilliform or scarlatiniform rash; occasionally there is pus formation and lymphangitis secondarily.

Treatment by local injection of 5 per cent. potassium permanganate has been recommended, but the author obtains better results by peripheral infiltration of 2 per cent. procaine and 1 in 1,000 adrenalin hydrochloride. Relief is speedy. If untreated the pain may persist for many hours. *H. H. S.*

KENRICK (G. W.) & DEL TORO (George), Jr. **Studies in Solar Radiation and their Relationship to Biophysics and the General Problem of Climate and Health.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1940. June. Vol. 15. No. 4. pp. 387–419. With 21 figs. [18 refs.] [Spanish version pp. 420–431.]

The purpose of the paper is to present solar radiation data of interest to general problems of climate and health, and to indicate applications to some of the problems.

Graphs are given showing the diurnal variations in ultraviolet radiation during the two years November 1937 to October 1939. The curves show both mean and maximal values for each hour from 8 a.m. to 4 p.m. for each month. The mean curves really give the combined resultant of stratospheric absorption and tropospheric cloudiness, while the maximal values probably give a better idea of true stratospheric absorption. The curves show different seasonal characteristics. The peak values give a curve which approximately follows the mean monthly air mass variation, while the average curve is influenced by cloudiness and precipitation so as to give low values in storm months. The observations of peak value for the two years generally agree within less than 10 per cent.

Mean monthly katathermometer cooling powers are computed for San Juan on the basis of mean temperatures and wind velocities over a thirty-year period. These cooling powers (wet and dry) have been calculated both with and without allowance for solar radiation. The dry kata cooling powers are lowest in August, September and October (4 to 5 in the sun and about 9 in the shade).

In a discussion of the bactericidal effect of ultraviolet radiation it is remarked that the important consideration is the product of the bactericidal activity at any wavelength with the solar radiant energy at that wavelength. The maximum value of the product occurs in the region of 3,050 Angströms, and the important band is from about 3,100 to 2,900 Angströms.

A measurement programme should be developed so as to provide comparable physical and climatological data of the widest application to biological problems. Much clarification is needed with reference to the biological importance of various types of radiation, *e.g.*, infra-red, visible, ultraviolet and cosmic. *T. Bedford.*

HOBMAIER (A.) & HOBMAIER (M.). **On the Life-Cycle of** *Linguatula rhinaria.*—*Amer. Jl. Trop. Med.* 1940. Mar. Vol. 20. No. 2. pp. 199–210. [12 refs.]

The nymphs of *Linguatula rhinaria* were observed as natural infections of *Mus norvegicus* and as artificial infections of the ground

squirrel *Otospermophilus grammurus beecheyi*. If rat is eaten by dog the nymphs, if they reach and remain in its digestive tract, are digested. If the dog vomits, the nymph freed by digestion and by its active movements reaches the mouth and nasal cavities, becomes adult and passes eggs in about six months, and may live for about 2 years, the eggs passing in the nasal mucus at first constantly and later at intervals of days or weeks. Active migration of nymphs swallowed in food from stomach to nose was without evidence. It seems that they may actively reach the nose more directly in the host's act of feeding. *Clayton Lane.*

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